

40 Rak ©

POPULAR **Computing** WEEKLY

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6-12 December 1984

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Vol 3 No 49

Atari 800XL price slashed



ATARI has further slashed the price of the Atari 800XL (see *Popular Computing Weekly*, November 22).

The retail price is now down to £129, a reduction of almost 25% from its previous price of £169.

The new price follows the announcement three weeks ago in the States that the 800XL would sell for just \$120 (about £100) over there.

The aggressive price cutting of the 800XL — Atari's only home computer in the Christmas market now that the 600XL model has been dropped — reflects Atari boss Jack Tramiel's policy of "marketing

for the masses".

"Manufacturing advances in high technology products mean that prices should be tumbling," commented Tramiel.

"Technology is what this decade is about. I've given this notion to my factories out in the Far East. They're going to produce it at the price the man next door can afford."

Atari factories worldwide are currently producing about ten million machines per year. A large proportion of these are targeted for the European market for 1985. Atari has recently appointed a European marketing manager, M. Rosi.

Further bargains for the Atari 800XL are available if you shop around. Laskey's, for instance, has an Atari Starter pack consisting of the computer, a joystick, data recorder, Introduction to Basic manual and one piece of software — which can be chosen from a selection — all for £170.

Prestel breached

PRESTEL, the British Telecom database, has suffered a second serious breach of its security.

On Sunday night a group of 'hackers' broke into Micronet only days after Prestel installed new security codes claimed to be unbreakable.

The 'hackers' took action after Prestel removed its second biggest information provider — Timeframe — from the system. Timeframe was asked by Prestel to withdraw a claim

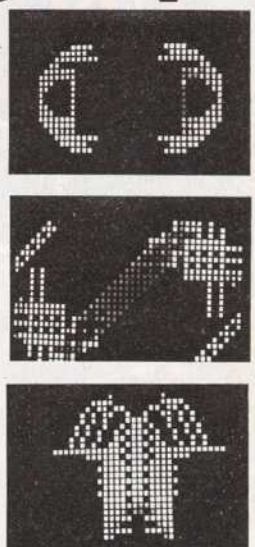
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Minter lights up

JEFF MINTER, author of Llamasoft Commodore classics including *Sheep in Space* and *Attack of the Mutant Camels* is soon to release his first non-games title for the C64 — to be called *Psychodelia*.

The program is best described as a light synthesiser, where the user can create moving patterns of ever changing colour on screen (best done listening to a favourite LP) using a joystick.

The program operates much like a sound synthesiser — only with light — and it is



continued on page 5



Oric's new IQ164 computer — details inside.

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WARNING: All software sold without IJK Software's standard conditions of sale, in terms of liability, copies available on request.

I was thinking of buying a micro this Christmas I would be looking pretty closely at the Atari 800XL.

Atari last week slashed its price once again so that it now costs only £129 — the same price as the 48K Spectrum.

Yet the Atari has 64K Ram and offers a number of features found only on more expensive machines — it has a better keyboard than the Spectrum Plus which costs £179. It has four sound channels, one more than the Commodore 64 which costs £199. The Spectrum models have only a one-voice squeak. The 800XL has a cartridge port and twin joystick ports, unlike the Spectrum models. It even has a monitor socket, sprite graphics and a display with up to 256 colours on screen at any one time.

In the words of Atari's latest ad the 800XL has now well and truly "socked the competition".

It's a big gamble. Before Jack Tramiel — Commodore's founder — split away and bought Atari in June the company had been losing \$800m a year.

He has worked quickly. We now have a considerably slimmed down Atari that is proving to be very aggressive in the market. He has just borrowed a further \$150m from his US investors push Atari back into the limelight. "Too many people have got too fat out of this business", he says.

The only problem with the Atari 800XL is software. The best programs are still unquestionably to be found on the Spectrum and Commodore 64 machines. Still, that should come if Tramiel's plan works.

The Atari 800X is now a very attractive purchase at £129. It makes Sinclair's Spectrum Plus — without either ZX Interface 1 or 2 built-in — look a bit mean, and the Commodore 64 look very overpriced.

It makes the £275-plus MSX micros look like no-hopers.

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Futures...

Which MSX? We spot the differences... And a machine-code taster of Jeff Minter's new *Psychodelia* to type in

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ABC

56,052 copies sold every week
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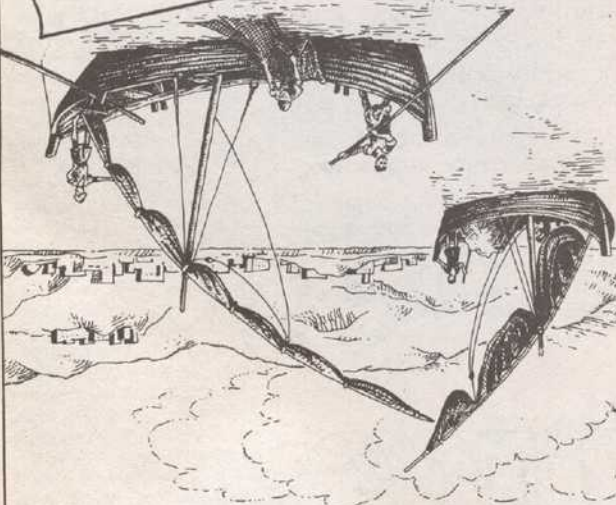
Written by Peter Goodlad - Author of JERICHO ROAD.

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GALILEE



for SPECTRUM 48k

SHARDS SOFTWARE PRESENTS ...

Psychedelia

continued from page one

possible to produce pre-programmed sequencing, and pre-set shapes. You can define the starting shape from which the program constructs its patterns and you can control the colour rotation sequence.

A number of built-in 'planes of symmetry' can be switched in or out to produce multiple images on-screen.

Further variation can be achieved by altering the bandwidth and the pulse length of the shape 'trail' which changes how the joystick effects the patterns. Finally, it is possible to record pattern sequences and then play them back.

"I enjoy writing games but I wanted to write something totally non-competitive but at the same time great fun to play and experiment with," explained Jeff Minter.

Psychedelia is being released in mid-December for the Commodore 64, C16 (which has a 128-colour display) and Vic20, priced at £7.95.

QL releases

IN THE same week as Psion's QL chess program is to be released Sinclair has announced a number of other new QL titles, which will become available before January.

An assembler package has been produced by GST which will be priced at £39.95.

QL Toolkit written by Tony Tebby and Sinclair adds 60 new commands to SuperBasic including full multi-tasking. *QL Toolkit* will sell for £24.95.

QL Cash Trader written by Accounting Software giving a dynamic profit/loss accounting system will sell for £39.95.

Finally, *QL Linker* from GST is a relocating linker for programs written in compiled languages of M68000 assembler.

CPC464 Forth

NEW hardware and software products have been announced for the Amstrad CPC464 by Skywave.

The company has produced an RS232 communications interface priced at £71.30, and also a Forth (Forth standard) language package on cassette, priced at £20.70, for the machine.

Details from Skywave, 73 Curzon Road, Boscombe, Bournemouth.

New IQ164 details

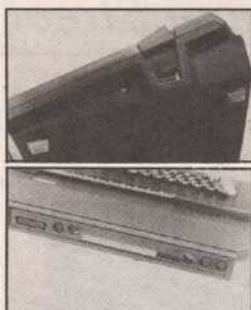
THE new IQ164 Oric machine, due for launch in January on the continent (as the Stratos) and in the UK shortly afterward, will be priced around £250.

The machine looks remarkably similar to the Atmos, using the same keyboard and black and red colouring on the casing.

The two cartridge slots on the upper left-hand side will offer a total of 112K Rom space for languages and applications programs. The machine contains no internal Rom — Basic is provided on a plug-in cartridge.

When Basic is used the function key can be used simultaneously with the other keys to give a single Basic keyword entry.

The machine also offers a Centronics printer interface,



two modem ports — one RS232, one V23, two Atari-style joystick ports, a cassette socket and both UHF and RGB/Peritel TV connections. It has a built-in disc controller and a Shugart 34-pin interface — giving the option to use 5inch discs as well as Oric's 3inch Hitachi-based discs.

Spectrum+ hits snag

SINCLAIR's Spectrum+ computer has run into reliability problems and the number of faulty machines has resulted in a severe shortage of the micro in the shops.

"The shortage of Spectrum+ machines is having a devastating effect on the Christmas market," said John Flatman, of Boots' computer buying department. "People are waiting until the machine finally arrives rather than buying an ordinary Spectrum, and it seems there are severe quality problems with the machine."

At W H Smith, a spokeswoman confirmed that the shops were not getting as many machines as they needed.

"We have been having problems with the keyboard in that many of the keys seem to be loose. Consequently, we have been looking at them and tes-

The Net spreads

MICRONET 800 is expanding abroad. A franchise to run Micronet has been given to the Hong Kong telephone company and Swedish PTT.

The Swedish franchise will make Micronet available to users in Sweden, Norway and Denmark.

Micronet's managing director, Tim Schoonmaker, says this is just the beginning. "Our next target is to take Micronet 800 to micro users in Australia and the United States."

ting them as they come out of the boxes.

"Recently the problems haven't been quite so bad as they were to begin with, and we are beginning to get replacements, though not enough."

"I am not aware that the situation is at all difficult at the moment," said Sinclair spokesman. "My impression is that things are a lot more positive this year than they were twelve months ago."



Prestel

continued from page one

that Prestel's security had been broken and when they failed to comply Prestel removed them from the system.

Angry hackers then succeeded in breaking into Micromouse on Micronet leaving the message "Bring back Timeframe — hack of the century".

The same group is also apparently attempting to break into BT's prestige information service BT Gold.

Elite bugged

THE Electron version of *Elite*, Acornsoft's top selling game has run into problems.

A bug has been found that means Hyperdrive between galaxies is impossible in the cut-down Electron version, making the playing area an eighth the size of its BBC counterpart.

An Acornsoft spokesperson commented "the single galaxy restriction does not affect the actual playing of the game. It is still possible to achieve Elite status."

Acornsoft Managing Director, David Johnson-Davies explained further:

"There is a bug in the program that means the game is played in one galaxy, but this does not affect the playing of the game — Elite status can still be attained.

"We regret the bug is present but, given the complexity of the game, it is difficult to guarantee the lack of bugs."

"However, if customers feel strongly about the matter, we will refund their money.

Acornsoft says that it is currently working to cure the problem and is looking at the possibility — if an eight-galaxy version can be produced — of replacing one-galaxy copies already sold with the corrected version.

Until it is known whether or not the problem can be solved, Acornsoft have no plans to alter the documentation supplied with the game, despite the fact that it clearly states that Hyperdrive is possible.

Micronet

Following last week's News Desk item headed *QL network by Prism*, we would like to make clear that Prism no longer has any connection with Micronet which is run jointly by EMAP and British Telecom.

SPECTACULAR
SOFTWARE SALE

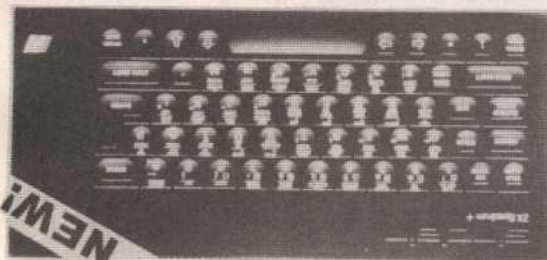
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Prism QL standard res. for Sinclair QL £199.00
Kaga Green screen High resolution £125.00

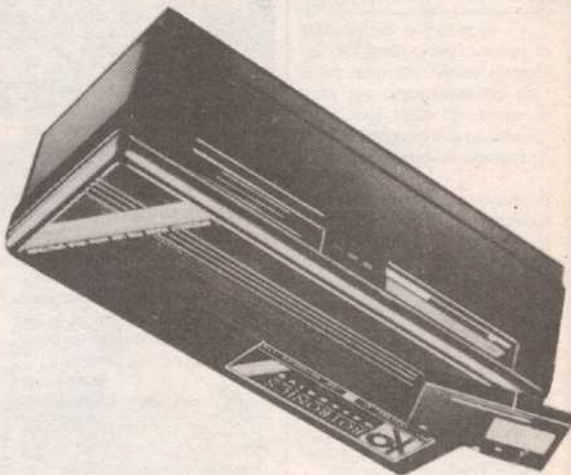
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Sanyo MBC 555 + Wordstar, Datasat, Inostar, Mailmerge £1100.00
Sinclair QL Sinclars powerful new 128k computer £397.00
Tatung Einstein including One 3 inch double sided drive £497.00
Psion Organiser £99.95

Hardware Bargains

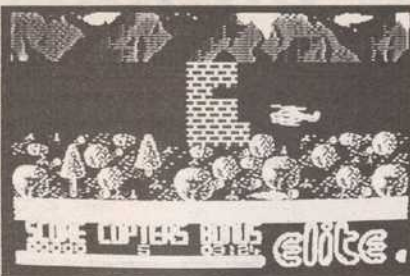


AIRWOLF is the latest game from Elite Systems based on the ITV series of the same name.

The player must guide his helicopter through 12 playing

screens to rescue, one by one, six kidnapped scientists.

The program will be available this month for the Spectrum priced at £6.95, and the Commodore 64 at £7.95.



- Following the Elite launch, advertisements for a forthcoming Ocean game, also entitled *Airwolf* have been withdrawn.

Sir Clive goes on show

A WAXWORK model of Sir Clive Sinclair will be on show in Madame Tussauds from next April.

Work on 'Sir Clive' himself has now been completed, but he will not be put on display until a model of Selina Scott is finished, as the two will appear in a tableau together.

"Sir Clive will be shown holding one of the Sinclair pocket TVs," explained a spokeswoman for Madame Tussauds. "Selina Scott will be looking over his shoulder, looking at the TV screen, on which there will be a picture of herself."

Free bundles

TOSHIBA is currently offering three software packs bundled free with its new Toshiba HX-10 MSX computer.

The three packs are CDS Micro Systems *French is Fun*, Ocean's *Hunchback* and *Manic Miner* from Bug Byte.

"These three were chosen largely because we wanted chart-topping products, such as *Manic Miner*," said a Toshiba spokesman. "But we are keen to emphasise that MSX does not just mean games machines, so *French is Fun* was added to the list."

Learn to read ...

SINCLAIR has released a further 13 educational titles for the Spectrum and Spectrum+.

Two — *Estimator Racer* and *Number Painter* — are ASK titles produced in association with Psion and priced at £4.95.

The remaining 11 at £7.95 are Sinclair Macmillan programs. Four of these are science simulations written by Five Ways and five are additions to the Learn to Read series from Fisher Marriot.

Tickets still to be claimed

A NUMBER of winning raffle tickets from the 14th ZX Micro-fair held on November 17 to 18 are still unclaimed.

The prize winning ticket numbers are as follows:

Green — 570, 582, 559, 834, 768, 879, 474, 993, 618, 871, 949, 825, 472, 309, 736, 697, 496, 684, 484, 817, 347, 303, 863, 900, 964, 478, 382, 271, 557, 275, 295, 420, 632, 347, 679, 711, 520, 348, 303.
Red — 770, 395, 506, 454, 645, 812, 515, 458, 960, 628, 782, 783, 402, 461, 475, 413, 436, 503, 493, 473, 372, 389, 413, 606, 411, 824, 806, 436, 611.
White — 230, 344, 201, 140, 503, 664, 498, 393, 889, 339, 502, 650, 120, 693, 474, 284, 89, 110, 148, 422, 200, 264, 148, 64, 187, 422.
Blue — 34, 111, 73.

The raffle, in aid of Capital Radio's 'Help a London Child' raised over £700 for London children in need.

The first prize was won by Mr M Slatford of S Croydon, Surrey.

If your ticket number appears above write to: ZX Raffle, 71 Park Lane, Tottenham, London N17 0HC, enclosing the ticket and a label with your name and address.

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QLUB fights back

In answer to the several points raised in R. Haigh's letter in the November 15 issue, Sinclair Research should like to point out that:

1) The second *QLUB News* was distributed on November 12 and our records confirm that R Haigh was part of that mailing.

2) The new-version Psion update will be offered free of charge to QLUB members as part of their membership entitlement. We may subsequently offer these up-dated versions to non-QLUB members but there would be a charge.

3) While R Haigh may feel that he does not need Psion software assistance, experience to date suggests that a large number of QLUB members do very much value this service — so far some 8,000 enquiries have been handled.

QLUB Editor
Sinclair Research
Cambridge

Ultimate news 1

I am writing this letter to put Mr N Brailsford who asked about Ultimate games on the 64, out of his misery. Ultimate have already produced a version of *Jet Pac* on disc — although I must admit that my *Jet Pac* is a pirate copy of a pre-release version.

PS Ultimate have released a game called *The Staff of Karnath* for the 64.

PS Sorry about the pirate version, Ultimate!

D Page
2 Park Approach
Welling
Kent

Ultimate news 2

I wish to stake my claim to be the first person to complete Ultimate's new Megagame/Movie/Classic program *Knight Lore*. After two weeks of solid playing I stirred in the last charm and was cured. This historic event (I) took place on Friday the 23rd of November at 6.19pm for those who wish to challenge my

claim. I won't say exactly what happens as it will spoil the aim of the game for other people. Seeing as the cassette inlay is so vague, as are reviews, here are a few playing tips:

- 1) You need two of each of the seven charms.
- 2) You must drop them in the cauldron in the correct order.
- 3) This is indicated by the cauldron steam.
- 4) You can't have three or more objects in a room.
- 5) You can drop and pick up, objects simultaneously.
- 6) Keep track of what you have collected.
- 7) Make a map!

Andrew Wappat
15 Dargate
Longthorpe
Peterborough

Misleading review

Your Book Ends review of Adrian Dickens' *The QL Advanced User Guide* (*Popular Computing Weekly*, November 15) is extremely misleading in its references to the 'Sinclair QDOS manual'.

This manual was in fact a preliminary draft of the QDOS documentation — a working piece of documentation which has never been published in any official form. It has been supplied by Sinclair Research Limited *only* to software houses who have applied for it.

Anyone subsequently seeking permission to quote from the manual has been warned of possible errors, and permit-



"What do you suppose Jack Tramiel's trying to do?"

ted to proceed only and entirely at their own risk, on condition that Sinclair's copyright in the material is acknowledged.

Sinclair expects to publish shortly its own comprehensive official Software Developers Guide.

Software Department
Sinclair Research
Cambridge

Imagine a micro

Even in the advanced digital microcomputer world we still have an electro-mechanical problem — the mass storage devices called disc drives.

A low-priced home micro costs around £150 — the disc drive which goes with it still costs up to £230. For the non-professional user a disk drive therefore seems rather expensive for what it does — storing and retrieving data — in comparison with the multitude of basic functions of the micro-keyboard, video-control, music, programming.

To be complete a drive has also secondary functions: the organisation of the data (*Copy, Delete, Merge, Directory*). It is these functions which make the drive so expensive.

Supposing it was possible to execute these secondary functions inside the computer without intervention of the mass storage device after the data is loaded.

I imagine a micro with 512K Ram and a fast tape or streamer as a mass storage device. Loading and saving memory would only be possible in sequential blocks of a fixed length: say, 192K Ram. This would make the tape operation very simple — a computer controlled start at the beginning and a stop at the end of the block. Without making the streamer too expensive it still must be possible to *Load or Save* a block in less than 15 second. Organising the data before saving would also be very easy, it would only be a matter of changing the data locations in the memory. Random accessing would no longer be a time consuming operation. With 512K Ram as memory it would be possible to

have two of the memory blocks present in the computer for merging and copying files. Moreover the DOS could be replaced by a simple, short menu-driven program.

It must be possible to build and sell a micro like this with a built-in fast tape unit for less than the cost of a micro plus disc drive — £400.

Cormon Eddy
Hof Van Tichelen 26
B2020 Antwerp
Belgium

Is the QL the kind of machine you had in mind?

Dragon still fiery

I was very disappointed to read in last week's *Popular Computer Weekly* that you were surprised at the large turn-out at the 6809 show.

The Dragon is alive, well and kicking like mad with a lot of support from a lot of not so small companies — not to mention a lot of owners who obviously don't think the Dragons are dead.

So many reviewers in the computer press obviously never switched on their review samples of the Dragon. If the number of non-existent Rombugs they all found is anything to go by it amazes me that it sold at all.

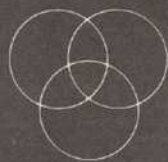
The Dragon is without a doubt far superior to the BBC, Spectrum and QL (I nearly forgot the Spectrum Plus with its drop-off keys which allow one to completely redesign the keyboard layout) etc, which is all most magazines (including yourselves) seem to class as computers.

If only the reviewers had bothered to admit that all they did was read the manual and base their review on that we might still have Dragon Data. If I appear to be upset it is because I am very disappointed to see the computer press are still kicking the Dragon when it is (a little) down.

Long live the Dragon.

J E Slad
3 Bridges Close
St Nicholas-at-Wade
near Birchington
Kent

LOGIC 3



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20 PAGE ISSUE
CHRISTMAS COMPETITION!

LOGIC 3

Spectrum Club

BRITAIN'S No. 1 SOFTWARE CLUB
WINTER ISSUE 1984/85

WIN A MICRODRIVE

Christmas Competition
1st prize: ZX Microdrive & ZX Interface 1 (worth over £70)

2nd prize: Currah µSpeech Synthesizer (worth £29.90)

10 runner up prizes of free games software (each worth over £10)

To Celebrate the Christmas season Logic 3 are running a grand Christmas Competition with a ZX Microdrive and Currah µSpeech Synthesizer as first and second prizes.

The ZX Microdrive, complete with interface 1, is undoubtedly the ultimate Spectrum add-on to allow programs and data to be stored and recalled. The Currah µSpeech is both powerful and easy to use.

To enter the competition carefully read the reviews in this catalogue then answer the questions in the Quiz and mail your answers before 31st January. Prizes will be awarded to the first 12 correct entries drawn.

Here's your chance to win these desirable Spectrum add-ons, but don't leave it too late, make sure your entry reaches Logic 3 before the closing date!



CLUB SUCCESS

The Logic 3 Spectrum Club was launched in July, 1984 and has been an outstanding success. Already more than half-way to its target of 10,000 members in twelve months, the continuous growth of the club has kept Logic 3's staff working seven days a week just to keep up with demand.

Tony Toller, Logic 3's managing director and coordinator of the Club, explains its success as follows: "With other clubs once a person has joined there is no more reason for the club to support its members who each month have to purchase a certain number of products from a short list. Our Club is different. Members have no obligation to purchase any products from the club so the pressure is on us to choose only the best quality products and offer a lot of pride. We also take a lot of pride in publishing independent reviews on all the products we carry and if we do not like something about a product we are not afraid to say so."

Tony Toller's policy of offering Club members a real service rather than just order business "is winning order business" is the main objective "as we grow so we will be able to improve our service to members still further and perhaps, one day, develop the club catalogue into a proper magazine." With the Christmas edition of the catalogue already running at a bumper 20 pages containing reviews of more than 180 products that day may come quite soon!

INSIDE

★ EDUCATION

A selection of the most effective educational programs available. Designed for children from the age of 4 to 16.

★ GAMES

The best games for the Spectrum selected by our own review panel and rated according to: graphics, sound, colour, originality and interest.

★ PROGRAMMING

The 'Learn BASIC' tutorials really show you how to write structured programs in easy to understand stages.

★ UTILITIES

Design your own games.

★ HARDWARE

Some good deals in hardware and peripherals.

Spectrum Club

The Logic 3 Spectrum Club has something for everyone: regular reviews, excellent savings on all the latest top quality games and educational software, and discounts on hardware.

NEW MEMBERS INTRODUCTORY OFFER
Join Logic 3 Spectrum Club within 60 days and benefit from our new members introductory offer to purchase our "Software Specials" at a huge discount.

MEMBERSHIP IS ONLY £3.00 PER YEAR
(Equivalent to only 25p per month)

TO JOIN FILL IN YOUR NAME AND ADDRESS ON THE ORDER FORM (OR ON A SEPARATE SHEET OF PAPER) AND SEND WITH YOUR £3.00 TO THE ADDRESS BELOW.

MEMBERSHIP DEPT.
THE LOGIC 3 SPECTRUM CLUB
MOUNTBATTEN HOUSE
VICTORIA STREET
WINDSOR, BERKS.

LOGIC 3

LOGIC 3'S SOFTWARE PANEL

Neil Atkinson, pupil of Sir William Borlase School, spends his weekends in a shop selling home computer software; intends to work as a journalist.

Andrew Goltz, director of Logic 3, spent 6 years with Commodore's UK and International Division, 'Instigated Commodore's 'Approved Product' scheme for third party software.

Bliss Healey, graduate of London School of Economics, has translated business software into French, currently working on the design of graphics for educational software.

Tony Toller, director of Logic 3, former journalist, specialist in business applications on Micros and co-ordinator of Logic 3's software club.



FREEPOST
(MEMBERSHIP DEPT.)
LOGIC 3
MOUNTBATTEN HOUSE
VICTORIA STREET
WINDSOR
BERKS.

Yes, please rush me a
copy of your Software Club catalogue

I have a ZX Spectrum Commodore 64
(tick box)

Name

Address

Perchance to dream

This week we offer you the chance to enter an intriguing adventure puzzle based on the new epic adventure, *The Sandman Cometh* by Star Dreams

The Prize

The Sandman Cometh is an adventure through the dark side of the mind, where logic is twisted and opposites meet. The objects of material reality are seen in strange new guises, the substance of the mental world holds sway.

To solve *The Sandman Cometh* you will need to learn the significance of dreams from Freud, symbols of reason from the world's greatest philosophers and jokes from the backs of matchboxes.

The Sandman Cometh is divided into two 48k Spectrum adventures. You are the dreamer searching for clues in a maelstrom of mental turmoil — seeking only the means to wake up. There are quality graphics illustrating most of the snuff that dreams are made of, and a rich vocabulary.

The Bait

The Popular Computing Weekly school of hack psychology and fringe religion invites you to win five copies of the *The Sandman Cometh*. First prize will consist not only of the game itself but also a bottle of vintage champagne!

Venture into 1985 with sparkling tastebuds and a contented expression. Ten runners-up will receive a useful Spectrum toolkit utility program from Star Dreams, creators of *The Sandman*.

What to do

The Sandman Cometh is no ordinary program and to win it you'll have to complete no ordinary competition. In each of the next two weeks' issues (December 13 and 20) we will be publishing a

rhyning couplet somewhere in Adventure Helpline.

In the third week — the January 3 issue — we will print a listing for a game that combines a quiz with an adventure. Complete the

clues, explore the adventure make use of the enigmatic advice offered in the two rhyning couplets and you'll hear a tune.

If you think you know the tune, name it, with a brief explanation of what you did to discover it (you can't get it just by looking at the listing incidentally) and send the details to Sandman Competition, *Popular Computing Weekly*, 12-13 Little Newport Street, London WCH7PP by 1 February 1985. The first 15 senders of correct entries get the prizes and the editor's decision (as usual) is final.

How to enter

★ A CRASH SMASH ★

▶ DARK STAR - HAS TO SAY THE LEAST STUNNINGLY FAST AND SMOOTH 3D VECTOR GRAPHICS ■ IT MUST SURELY WIN THE ACCOLADE AS THE FASTEST SPECTRUM GRAPHICS EVER ■

HOME COMPUTING WEEKLY FIVE STAR RATING

▶ SUPERB MOVING STAR EFFECTS ■ IT BECAME OBVIOUS THAT THIS WAS SOMETHING SPECIAL ■

PERSONAL COMPUTING GAMES PCG HIT

▶ I FOUND IT EXCITING AND COMPELLING AND KEPT WANTING TO HAVE JUST ONE MORE GO ■



Mail Order enquiries and catalogue of other titles:-
2, Ashton Way,
East Herrington,
Sunderland SR3 3RX

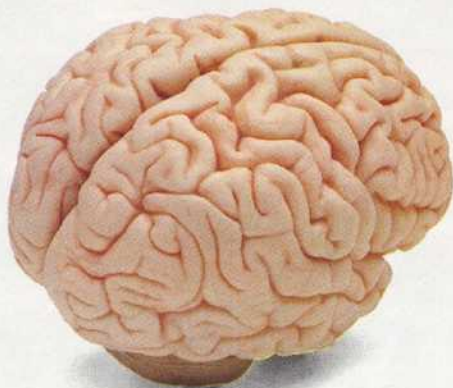


DATA IS KING

DATA IS KING

**Our new
software**

**makes the
most of yours.**



By any standards, the Activision Designer's Pencil is a unique piece of software. With it, you can design, draw, plan.

You can draw the world and everything that's in it.

And then set it to music.

You can produce complex designs in no less than sixteen different colours.

You can write and develop your own programs, without having to understand Basic.

You can do all this with a joystick.

But then you've only scratched the surface.

As you use the Pencil, it will reveal the full potential of your computer, in the most entertaining way possible.

£11.99 might be a lot to pay for a pencil.

But not this one.

When you've done zapping the world, rebuild it with the Designer's Pencil.

Its scope is as broad as your own mind.


ACTIVISION[®]
Your computer was made for us.

£11.99 Commodore 64, £9.99 Sinclair Spectrum. Available soon for all popular systems.

FROM SELECTED BRANCHES OF BOOTS, JOHN MENZIES, AND GOOD COMPUTER SOFTWARE STORES EVERYWHERE.

Are you only using

And for those you need peripherals.

Like a Commodore disk drive, a really fast

storage and retrieval system with a vast memory.

Or a Commodore cassette unit, the

inexpensive way of loading and storing programs.

For those who like the idea of text and graphics

being more alive and having greater clarity than

on a TV, there's the Commodore colour monitor.

To only play games on a Commodore

computer is like asking Albert Einstein to work out

the square root of four.

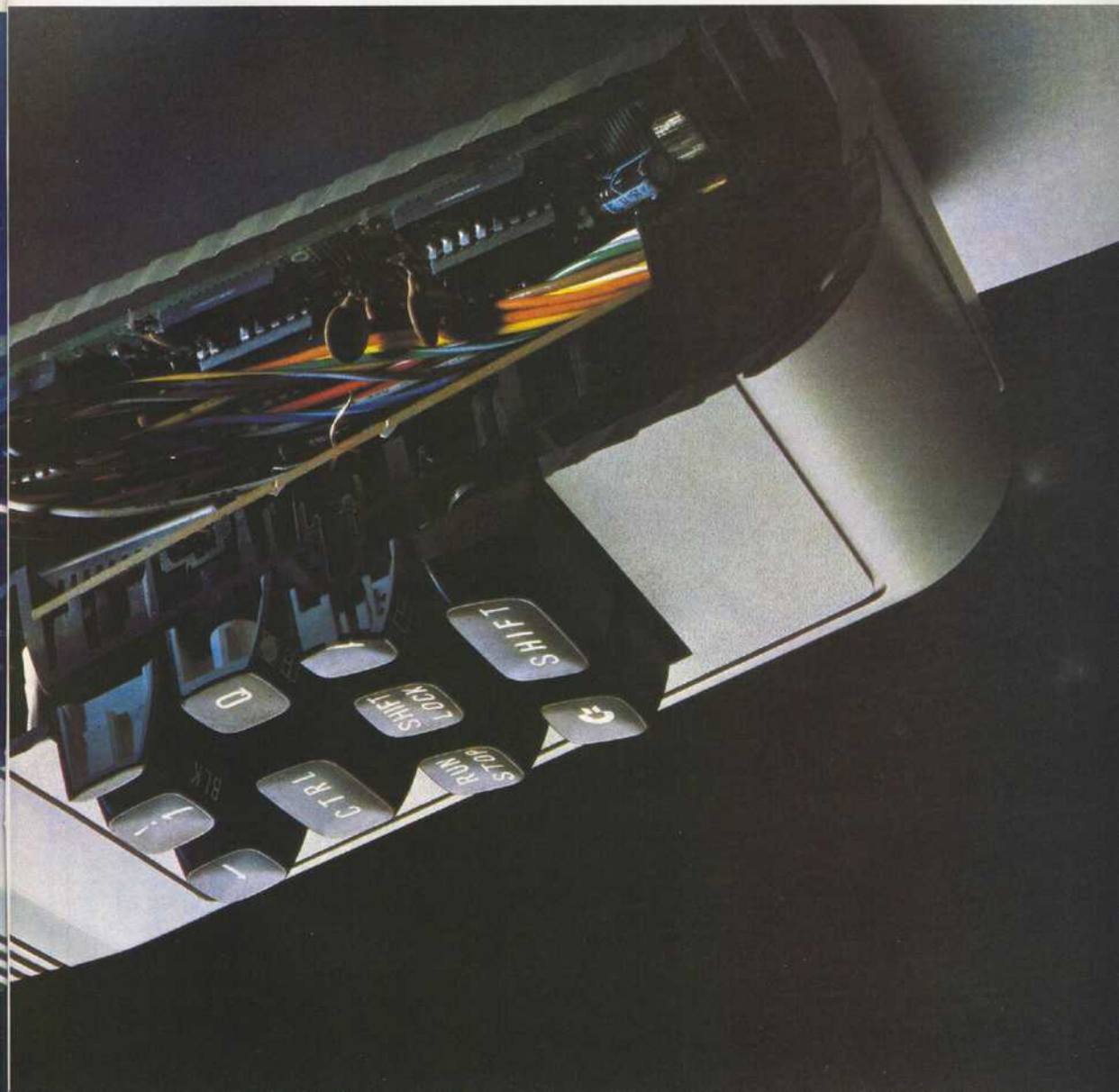
The computer's brain barely ticks over.

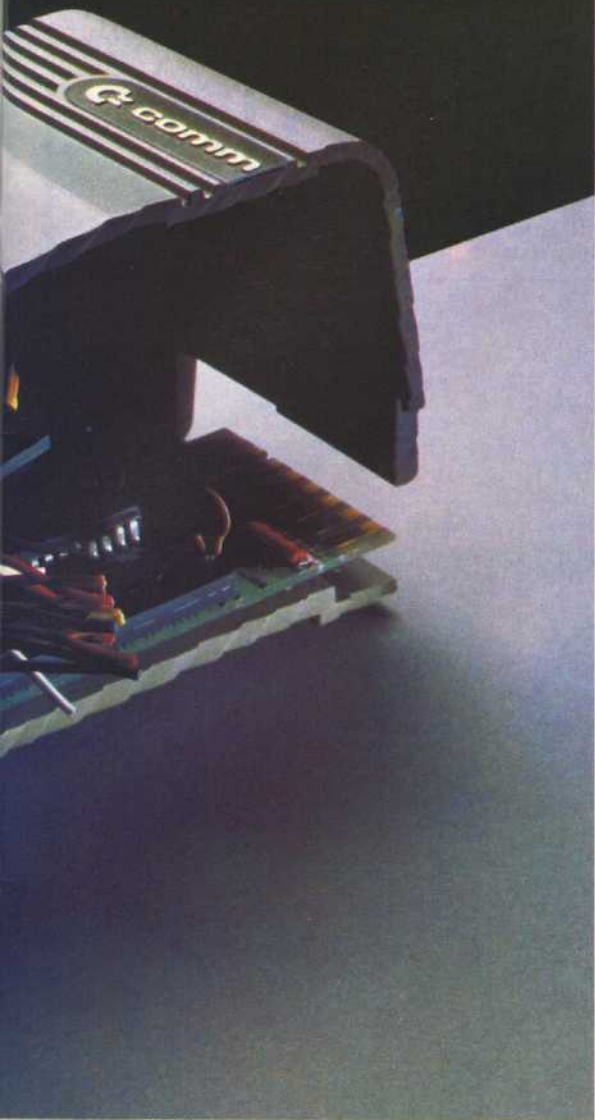
To really stretch it, you need more interesting

software programs. For example, record keeping,

interactive education, stimulating adventure games

or word processing.

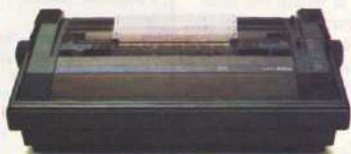




COMMODORE MPS801
 Dot matrix printer: £230.00.
 Tractor feed. Print speed:
 50 characters per second.



COMMODORE MPS802
 Dot matrix printer: £345.00.
 Friction feed for standard
 paper. Print speed:
 60 characters per second.



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 Letter quality print on
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COMMODORE 1520
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COMMODORE 1541
 Disk drive: £229.00.
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COMMODORE 1531
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 16 and Commodore plus/4.

COMMODORE 1530
 For Commodore 64,
 £44.95 each.



COMMODORE 1701
 Colour monitor: £230.00.

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 (prices from £7.50)

PADDLES (£13.50)
 Details correct at time of going to press.

1/10th of your brain?

And for hard copy, there are our four printers and a printer/plotter. These will preserve on paper—in colour, black and white, chart form, graphs or text, the fruits of all your labour.

Finally, for more exciting games, there are joysticks and paddles.

So use your brain. And make sure you use all of your computer's brain.

FOR FURTHER INFORMATION, TICK ONE (OR MORE) OF THE BOXES ABOVE AND SEND TO THE COMMODORE INFORMATION CENTRE, 1 HUNTERS ROAD, WELDON, CORBY, NORTHAMPTON NN17 1QX. TEL: CORBY (0536) 205252.

NAME _____

ADDRESS _____

PEPCY 13/84



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Lunar Module

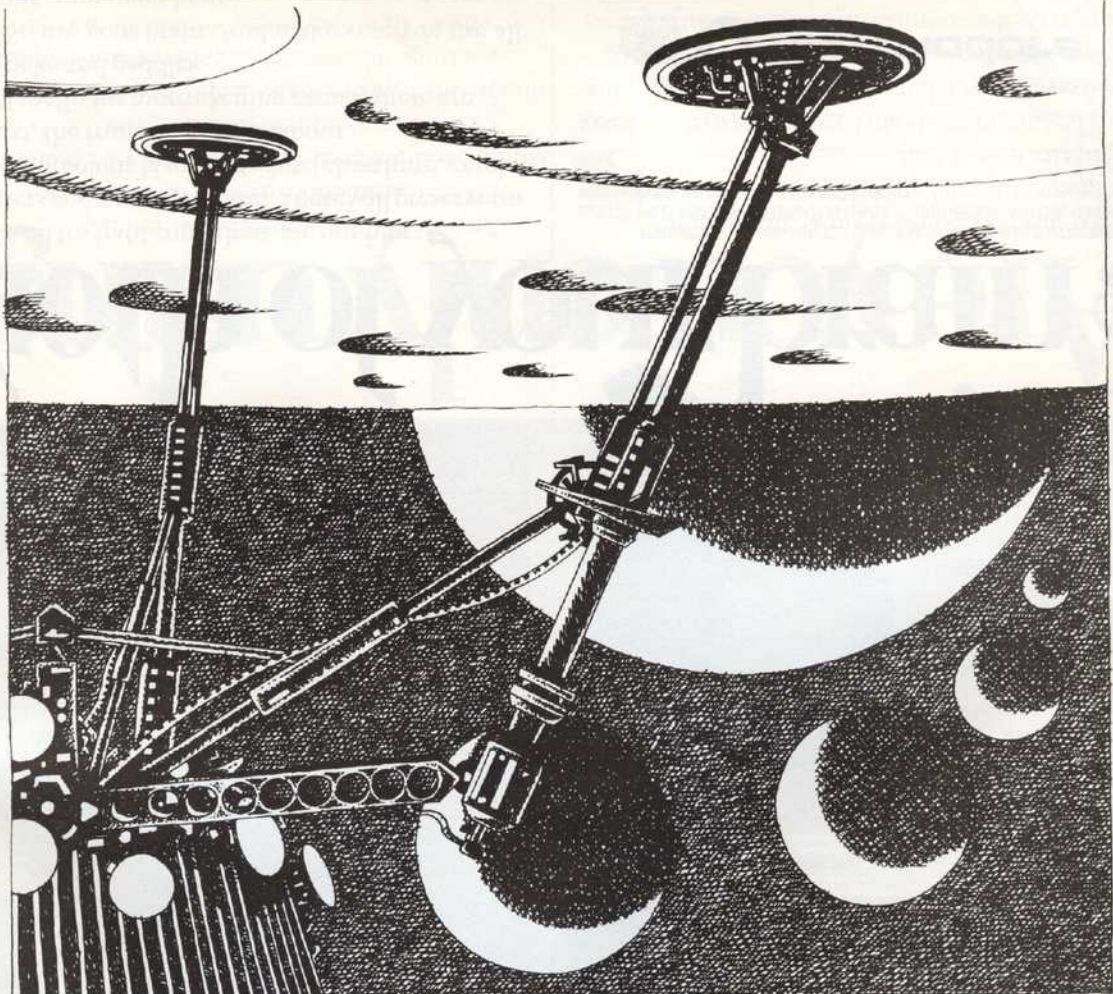
Your chance to make that giant leap for mankind on the Dragon 32 by Ashley Watson

This program simulates the landing of a lunar module on the surface of a planet. The speed at which the craft falls, etc., is quite accurate because a number of equations are used — Lines 3030 to 3090 — which calculate fuel used, fuel left, mass of module, velocity and height above the planet's surface. On a successful landing, the speed at which the landing took place will be shown. Dragon

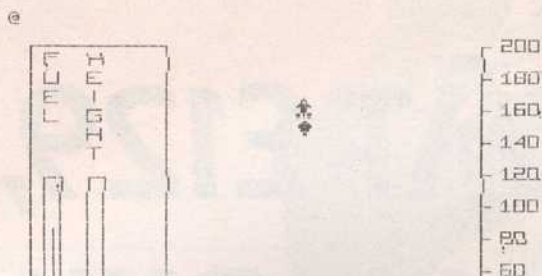
Program Notes

Times
10 - 210
1000-1120
Main loop
2000-2080
Check keyboard
3000-3100
Calculate
4000-4080
5000-5140
Crash/land routines

6000-6150
Display instruments
6160-6250
Print space ship
7000-7040
Draw landscape
8000-8130
Instructions
8900-8980
Another go?
9000-9300
Used to set up display
Data for letters, numbers and
machine code
9310-9390



THE FOLLOWING IS A SCREEN DUMP OF THE PROGRAM



```

10 REM
20 REM initialise
30 REM
40 CLEAR 100,32700
50 DIMW$(26),NU$(10),R(10),R1(10)
,R2(10),R3(10)
60 FORA=1 TO 26:READW$(A):NEXT
70 FORA=1 TO 10:READNU$(A):NEXT
80 PCLS:FORA=0 TO 10:READ DA:POKE1536+
(A*32),DA:NEXT
90 FORA=0 TO 7:READ DA:POKE1538+(A*32)
,DA:NEXT
100 FORA=32701 TO 32738:READB:POKEA,
B:NEXT
110 GET(16,0)-(24,8),R2,G
120 GET(0,0)-(8,10),R,G
130 GET(100,100)-(108,110),R1,B
140 GET(100,100)-(108,108),R3,G
150 GOSUB 8000:GOSUB9000
160 V1=100
170 H1=1000:H=H1
180 F1=500
190 M1=2500
200 MU$="L80T80V31AV25BV20CV15D"
210 CR$="01T255L255BAG"
1000 REM
1010 REM main loop
1020 REM
1030 GOSUB 6000
1040 GOSUB 2000
1050 IF H1<1 THEN 5000
1060 GOSUB 3000
1065 IF H1>1000 THEN CLS:PRINT" THE
PLANET IS NOW OUT OF RANGE
DUE TO OVER THRUSTING.
MISSION FAILED":GOTO8500
1070 GOSUB 4000
1080 IF H>=200 AND H1<200 THEN F4=1
ELSE F4=0
1090 IF H<=200 AND H1>200 THEN F5=1
ELSE F5=0
1100 IF F5=1 THEN C=1000:GOSUB 9210
1110 IF F4=1 THEN C=200:GOSUB 9210:GOSUB70
1120 GOTO 1030
2000 REM
2010 REM check keyboard
2020 REM
2030 A#=INKEY#:IFA#="" THEN 2070
2040 J=ASC(A#)
2050 IF J<48 OR J>53 THEN 2070
2060 K=J-48:GOTO2080
2070 K=0
2080 IF F2>0 THEN F=K*10000 ELSE F=0:K=0
2090 RETURN
3000 REM
3010 REM calculate
3020 REM
3030 V=V1:H=H1:F2=F1:M=M1
3040 A=(F/M)-2
3050 V1=V-A
3060 H1=H-V
3070 U=(F/50000)*50
3080 F1=F2-U
3090 M1=M-U
3100 RETURN
4000 REM
4010 REM delay / print thruster
4020 REM
4030 IFK<>0 THEN PLAY MU$:FL=E6+2:FM=
E6+10:PUT(128,FL)-(136,FM),R2,PSET
ELSE FL=
0:FM=0
4040 FORB=1 TO 300:NEXT B
4050 RETURN
5000 REM
5010 REM crash or land
5020 REM
5030 IF V1<5 THEN 5100
5040 REM
5050 REM crash routine
5060 REM
5070 FORQ1=1 TO 13:CIRCLE(130,175),Q1:
PLAY CR#:NEXT Q1
5080 FORQ3=13 TO 1 STEP-1:CIRCLE(130,
175),Q3,0:PLAY CR#:NEXT Q3
5085 CLS:PRINT"YOU CRASHED AT A SPEED OF";Z

```

continued on page 20

ATARI 800XL

At last, serious home computers are up against serious competition. The ATARI 800XL offers everything other competitors in their price range offer. And, as you can see above, a great deal more. No other computer makes your tongue hang out further.

**AT £129,
LOOK HOW THE
ATARI 800XL
LICKS THE
COMPETITION.**



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4 "SOUND" VOICES				+
MAX 256 COLOURS ON SCREEN AT ONE TIME				+
DIAGNOSTIC "SELF TEST"				+
CASSETTE "SOUND TRACK" CAPABILITIES				+
64K RAM			+	+
PROGRAMMABLE JOY STICK PORTS			+	+
SPRITES			+	+
CARTRIDGE SLOT			+	+
MONITOR SOCKET		+	+	+
BUILT-IN "BASIC"	+	+	+	+
COMMUNICATIONS CAPABILITIES	+	+	+	+
REAL KEYBOARD	+	+	+	+
	SINCLAIR SPECTRUM PLUS	ACORN ELECTRON	COMMODORE 64	ATARI 800XL

```

5086 PRINT"METRES PER SECOND"
5090 GOTO 8500
5100 REM
5110 REM land routine
5120 REM
5130 REM
5140 GOTO 8500
5150 PRINT"METRES PER SECOND"
5160 REM
5170 REM
5180 REM
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5210 REM
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5330 PRINT"METRES PER SECOND"
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5350 PRINT"METRES PER SECOND"
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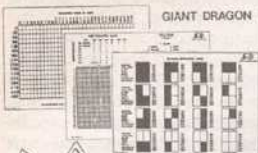
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Bombs out

Program QL Machine-Code Editor/Assembler Micro QL
Price £29.95 **Supplier** McGraw-Hill Book Company, Maidenhead, Berkshire.

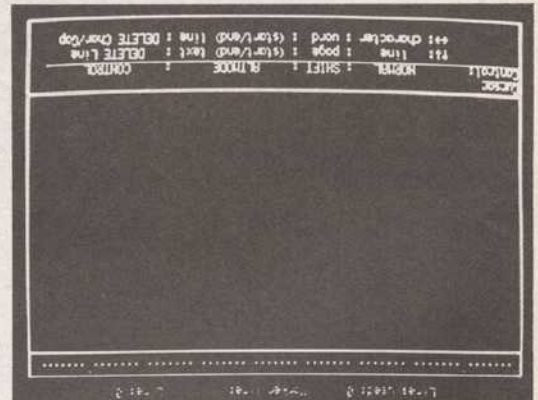
This is a product from the software arm of McGraw-Hill, and is advertised along with their QL machine-code book.

It consists of two separate programs — a screen editor, and the 68008 assembler.

The editor is actually written in SuperBasic, which has its advantages and disadvantages. The advantages are that it is easy to write and debug, but the disadvantage is the complete lack of crashproofing. Note that I have not mentioned speed, as it is not really noticeable slow — in fact, it is still faster than Paton's *Quill*.

The problem occurs when you enter a program and saved it, it would be useful to have an option in the editor to load the assembler.

The assembler is thankfully written in machine-code and runs as a proper job, so would run concurrently with the editor if it didn't insist on Newing itself. It asks for three filenames, for the source, the object code, and the listing, then gets on with it. It is fast, with none of the overlaying problems I experienced for example on the Metacomco assembler.



Save or Load a file — if any error occurs, such as not finding the file, the program bombs out with an error message.

My preliminary instructions didn't mention what to do after it crashes out — which it did quite often. After contacting the authors, they came back to me with a *Copy* command that would re-start it.

The editor itself has the barest of features, and though it has a (slow) search facility, it does not have a search and replace option which, because of its non-standard syntax, is rather necessary if using files from other assemblers. Having

The editor is OK, but, it was converted to machine-code with error trapping it would be vasily improved.

The assembler is non-standard, as is Metacomco's, but works quickly. Compared with Metacomco's, it's a case of you pays your money, you get very crowded — I have just got the official Sinclair one, and two others are also imminent.

With all these assemblers available for the QL, why doesn't some other software come out for it?

Andrew Pennell

Landlubber

Program Yacht Race Price £9.95 **Micro Spectrum** 48K **Supplier** Hill MacGibbon 92 Fleet St, London EC4Y 1DH.

With slight simulators reaching greater and greater sophistication where do you go next? How about a yacht simulator? It certainly strikes a note of originality amongst the usual churning out of programs.

Hill MacGibbon have given their range the title 'Games that stretch the mind' and it is in this area of education that I give this my highest marks. For a command landlubber like me, it's a real pleasure to develop an easy familiarity with terms like lacking and gyb'ing and to be honest there's a much greater chance that such gems will be put to practical use in a real boat than the hours of racefiction in *Fighter Pilot* ever will.

How accurate a representation of the behaviour of a real yachting program gives you only the references which link all the names or concepts selected. Each reference gives you the Act, Scene and Line in the play so that you can refer to the original text, and it also provides a paragraph of comment, which points out the particular significance in the play of this reference. The comments not

needs to be treated with some caution. I often have the feeling that you would be better off spending your money on a good textbook, rather than a computer program, the Penguin Study Software Series of study aids for Shakespeare's plays overcomes my reservations. From the evidence of the program for *Henry IV Part One*, anyway. The program works like a small database system containing references to a number of key characters and topics relevant to the play, eg Falstaff, Hal, Henry, loyalty, kingship.

You select the character or topic of interest to you using an easy-to-use search menu, and the program will then present you with a series of references to the chosen subject. If you select more than one subject,

only inform, they question — making you think through your understanding of the play. This is a well designed educational package where the computer is used to provide input and give insight in a way which could not be easily achieved using a book of the usual addition to the study of Richard Corfield

I am truly not qualified to say, however, the presentation is faultless with supporting documentation and publishing company, excellent as would be expected from a microdrive option.

The game itself is well programmed by Five Ways Software, but is let down slightly by the graphics. Doubtless they accurately reflect the speed of happening at all — more detail is needed to keep the display interesting. The only exception is the computer controlled boat which disappears so rapidly into the horizon that you can't help wondering whether it is cheating. For those good enough to give it a real race the game must be much more exciting, but I found it a bit too pedestrian and price to have more than limited appeal.

Tony Kendle

insight



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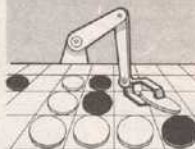
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Sounds good

Program Se-Ka of Assist

Price £2.99 **Micro Spectrum**

48K Supplier Master Vision,

Park Lane, 111 Park Road,

London NW8 7JL

There's also far better use of sound than in most adventures (fall off a path and see what I mean).

What is lacking is content.

With a good number of rooms,

all made up of the same elements, a sense of repetition

soon sets in. There are too

many empty places — in fact I

was left wondering whether I'd

missed something, but didn't

have the incentive to go back

and find out what. As for the

Dark Hordes, I kept getting

warnings that they were following me but never met them.

Sad, because a good bit of

the tedious.

There's undoubted programming

talent behind this game, but it's all rather like a

picture book without a story.

Obviously for the price it's no

rip off and is certainly worth a

look if you're an absolute ad-

dicator.

John Minson

Program Jack and the Beans

Price £7.99 **Micro Spectrum**

48K Supplier Superior Software,

Dept C, Regent House, Skinner

Lane, Leeds

The fairytale of Jack and

his adventures with a

magical beanstalk is the

best game from Superior Soft-

ware. To be cruelly analytical it

is a ladders and platforms

game — but a first-rate variation

on the theme.

You control (from the key-

board only) Jack's movements

which are fast and well animat-

ed. Climbing the beanstalk is

not as easy as it looks —

grabbing golden eggs and

harp (could Guinness have

been an inspiration?) and

police-come through a bank

window. This releases bags of

gold which then cascade down

the screen. Your job is to run up

and down ladders and across

platforms collecting the bags

of gold.

A lot of kicking is encour-

aged in this game. If you aim a

sharp boot at a flashing police

box (one of the old Tardis-

shaped sort) the traffic lights

change to red

for some reason change to red

and this gives you the chance,

just by touching him, of

knocking the poor bobby into

the water.

In short, a reprehensible

little game — I liked it.

Fred Short

to their rightful places. In a week which has produced many good new adventures, this one is in some ways, a disappointment. The illustrations are rather good, with animated flames on the torches and a useful compass indicator at the top of every scene.

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above all...the Giant's bags of gold. As per the original story, the Giant gets upset and pursues you very rapidly indeed. Dodging is extremely hard and the recommended escape is to spin down the beanstalk and grab an axe to cut off his

descend. A fresh beanstalk will grow to let you try for more. There are an assortment of this all goes on. Smoke blowing distillage you from the beans-talk. Snails attack you in the Giant's lair. If you're quick,

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Harping on

case it's the impending show, agency to the cat hunting, calls for an incentive — in this

Obviously, to add a sense of urgency to you are tractors. happen to you are tractors.

change that the worst that can happen to you are tractors. Obviously, to add a sense of urgency to the cat hunting, calls for an incentive — in this case it's the impending show,

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quite a fine game. Dave and Ian Watterson

of programs but it is actually big himself. It may not be the most novel

off the snails and slow down the though, you can dig holes to kill Giant's lair. If you're quick,

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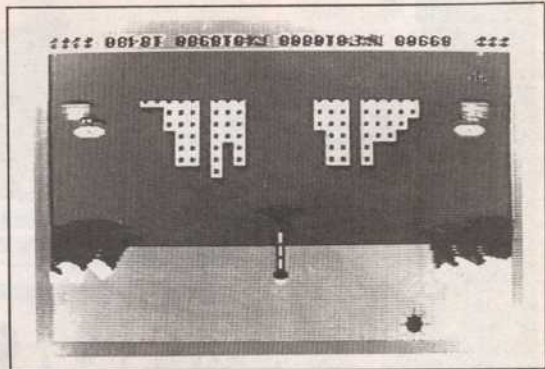
Demolish

Program *Catastrophes Micro*
Commodore 64 Price £3.95
Supplier Mirrosoft, Holborn
Circus, London EC1

You sometimes see buildings being erected in some unlikely locations, but rarely are they as inhosptable as the site in *Catastrophes*. In this game, you have to

sort of damage, for example, tall narrow buildings are particularly prone to collapse in an earthquake. Fortunately, you get a few seconds warning of any impending disaster so you have a few more blocks to minimise the damage.

You score points for each block and each new storey in the building, but you lose again about every computer has a version of *Kong* available for it and here for the Electron (the BBC's baby?) is *Zany Kong* (Price £7.95 Supt. £11.95) from the excellent



build a skyscraper on a tiny island in an area wrecked by earthquakes, hurricanes, lightning and floods. The building blocks are ferried in by boat, and you have to artil them into place by helicopter. This aspect of the game is not particularly difficult. However, the natural disasters occur amazingly often, and large parts of the new building are often demolished. Each type of catastrophe causes a characteristic

Shattered

Program *MacMan's Magic Mirror* Price £9.99
Supplier Sinclair Spectrum 48K
Research Limited, Stanhope Road, Camberley, Surrey GU15 3PS

a bit different which, surprisingly, turns out to be quite compulsive. The graphics and sound proved to be rather disappointing and something more dramatic for the disasters would have lent it up. I eventually become frustrated after my new building had been repeatedly demolished by persistent catastrophes.

Richard Corfield

There are three games to be completed. Pegs have to be placed on one side of a line in positions that mirror those already on screen, after which a mirror jigsaw has to be constructed. Finally sections of geometrical patterns have to be shifted into place.

The first time the child has the help of a grid, but for the second he or she is strictly on his or her own — even adults will find this tricky. Finally a score, plus high score, are displayed.

Four different types of mirror are available — diagonal being particularly tricky. That is why MacMan, the symmetrical Scot, wanders around various mirrors in search of perfect balance.

The booklet accompanying this looking glass lesson explains the importance of educating four to eight year olds in the skill of recognising symmetry in patterns.

That is why MacMan, the symmetrical Scot, wanders around various mirrors in search of perfect balance.

continued on page 32

Erratic

Program *Zany King Junior Micro*
Electron Price £7.95 Supt. £11.95
gent House, Skinner Lane,

Leds

Every computer owner must be familiar with the game *Dokker Kong*, just about every computer has a version of *Kong* available for it and here for the Electron (the BBC's baby?) is *Zany Kong* (Price £7.95 Supt. £11.95) from the excellent

The theme has been subtly changed to avoid the 'woman-in-peril' scenarios and this version has poor Zany Kong kidnaped by the evil Morris. You must collect the keys and release him from the iron-barred cage which holds him prisoner at the top corner of the screen.

Frozen

Program *Percy Penguin Micro*
Commodore 64 Price £7.95
Supplier Superior, Ground Lane, Leeds.

I published about a year or 18 months ago, it would have seemed pretty good compared to the relatively small number of decent games then available for the 64. The simple, but effective, colourful graphics, together with the uncomplicated action, would have seemed very good then.

Unfortunately, in the last year or so, a great many really excellent games have appeared again.

The game lacks any really striking features to distinguish it from many other similar games — often with better graphics, greater variety, more features, or just more of a challenge.



Richard Corfield

in a maze full of ice cubes. Unfortunately for Percy, there are some deadly Sno-bees in contact with the Sno-bees, and may he can survive is to avoid contact with them when he gets the chance by throwing some of the ice cubes at them. If he disposes of all of them, another lot appear and he has to start all over again.

The game lacks any really striking features to distinguish it from many other similar games — often with better graphics, greater variety, more features, or just more of a challenge.

red, making this now look very

Fred Short

Obviously *Kong* games are still very popular. This version for the Electron must rank as one of the best for the machine.

Obviously *Kong* games are still very popular. This version for the Electron must rank as one of the best for the machine.

Obviously *Kong* games are still very popular. This version for the Electron must rank as one of the best for the machine.

Each game opens with Zany Kong being winched in his cage to the top of the screen, accompanied by appropriate music which plays throughout the game.

As usual your task is not easy — involving climbing up a series of ropes or vines preferably in the correct order. Getting in your way are cree-

pies called snappers, and several dark birds — whatever they are, I always thought the ark was related to the pig family — which seem to continue up and down the vines in an erratic manner as though they know just what your next move is.

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EXPLORING THE SENSE OF SOUND!

3 Channel Sound Synthesizer

Any microcomputer is capable of manufacturing sound, however in order to produce a single octave 'C' note with a frequency of 8372 Hz the signal needs attention over 16,000 times per second.

To produce software capable of performing just this one task would be difficult if not impossible, especially when you consider that to produce arcade type sound effects require even greater attention.

The production of these sounds effects without the constant attention of the processor is now possible thanks to the AY Sound Chip, its flexibility makes it essential for a wide range of applications including music synthesis and sound effects generation, continuing the monitoring and production of sound after the initial command. More often than not realistic sounds require more than one effect and this function is provided by 3 independently controlled channels, as an example, compare the sound produced by the single note of C, with that produced by the chord 'C' and you will know just what I mean, likewise producing the sound of an explosion using all 3 channels gives games a totally new dimension.

Add to this the ability to alter the pitch tone and shape of the sound you have produced and it's flexibility is unlimited. In simple terms, imagine the note you have produced as a calm sea, by altering the pitch and shape you can produce waves, the top of the wave corresponds with the maximum volume and pitch of the note, which like the wave itself rises and falls.

Free Music Designer Cassette Worth £9.95

Beethoven to Bowie - Starwars to Splats.

The screen display shows all functions. Simply move the cursor along the keyboard, select the desired note by pressing the fire button and the note selected then appears on the screen.

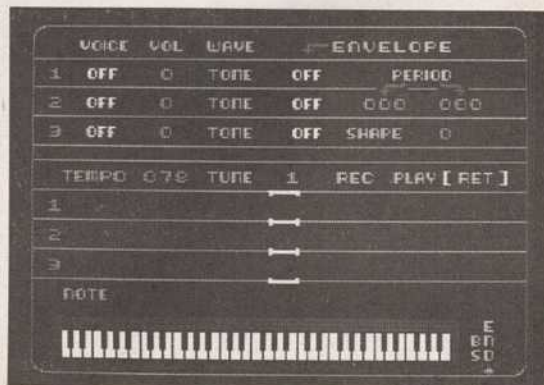
You can vary the tempo/volume and when 'played' the notes simultaneously scroll across the screen. 10 Envelope controls mean that once created, tunes and sounds can be subtly altered given varying attack and decay times to create futuristic music and sound effects. You can record and save up to three different tunes and amend each one as necessary. The dk'tronics Sound Synthesizer is suitable for both Spectrum and Spectrum + models and is guaranteed to give you hours of fun and would make an ideal Christmas gift, you never know you might turn to be another Stevie Wonder.

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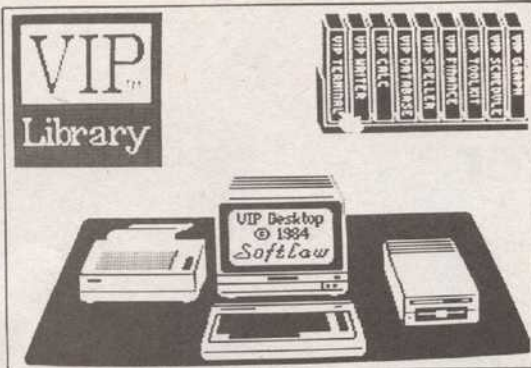


Advanced

System *VIP Terminal Micro*
Commodore 64 **Price** £50 on disc
Supplier Impex Designs, Metro House, Second Way, Wembley, Middlesex

Modems and the development of phone-in systems seem to be getting a good deal of attention these days. The speeding up of the British Telecom acceptance procedures for modems and the increasing interest of large companies such as Commodore and ICL in the commercial potential of phone-based communications are helping to generate interest. However, we are still somewhat behind the USA in this field and many of the new systems appearing in the UK now are based on American experience.

The VIP Terminal software, developed in Minneapolis, is a good example of the level of sophistication which can be achieved. The package gives nearly all the facilities required to fully exploit phone communications. Nine major functions allow you to set up a wide



range of options: a help facility, a screen display setup, a telephone directory, the communication mode itself, a facility to pre-program short messages on to certain keys, a real-time clock with alarm, disc management and file editing, and a printer-driver routine.

The display can be modified to show 40, 64, 80 or 106 columns of text, in any colour. Of course a monitor is suggested for the highest resolution. Automatic wordwrap can be switched on, and audible margin-warnings can be requested.

The terminal handles baud rates from 50 to 2400, including

split rate 1200/75, assuming that your modem is as versatile. The software gives you full control of such things as parity, stop-bits, duplex, linefeeds, pause characters, the sending of special characters, and so on. All those things which may change from system to system and can cause major problems for the inexperienced or non-technical user, such as myself. It is possible to call for help or modify these settings whilst in the communications mode.

The phone directory lets you keep phone numbers, settings for different systems (such as baud rate), and log-on messages. If you have a suitable

modem you can even get the software to auto-dial and log on for you. Unfortunately this is where the American software is of limited use. Commodore have released a number of modems in the States which are driven by this software, but many modems sold in the UK do not use the same method for auto-dialling.

The disc commands let you set up files on disc, modify files, send stored files through the modem, and receive and store files. Non-Commodore printers as well as the various types of Commodore printer are allowed for to produce a hard-copy of your communications.

The VIP Terminal is a very advanced package, giving facilities and a level of control usually reserved for business micros. The cost takes the software out of the games-software league, and deservedly so. A pity that the auto-dial may only be used by some, although most modems (thanks to BT) do not support this facility in any case. Incidentally the software cannot be used to drive the Compunet modem, nor can it be used to give full access to Compunet.

John Cochrane



Deuce

Program *Match Point* **Price** £7.95 **Micro** Commodore 64
Supplier Psion Limited, 22 Dorset Square, London NW1.

How about this for a last-minute contender for the Christmas No 1 slot? Psion — better known for its Sinclair titles — has produced its first ever program for the

Commodore 64, a conversion of its excellent Spectrum release *Match Point*, the tennis simulation to beat all tennis simulations.

So many Spectrum to Commodore conversions turn out to be disappointing — *Match Point* is a welcome exception. It all bodes well right from the speedy loading, followed by the title screen depicting a hunky specimen of the tennis fraternity.

As you might expect, the

graphics are bolder, even more life-like than the original, as the players skedaddle round the court on little legs at a great rate.

Choose from three speeds of play according to ability and how much you want to trash the computer at its own game. The quarter final's speed is good for starting off with to enable you to work out how best to play the shots. Semi-final pace gives a good playable game, while the finals will soon have you reaching for the sweatband and umpire's refreshments yourself.

Almost as much fun as playing is watching two players battle it out in demo mode — no tantrums over dubious line calls here, and the Commodore crowd are a passive lot too — they don't turn their heads to follow the ball as they did on the Spectrum.

Three final points worth mentioning: the game is joystick controlled only, the blurp on the inlay says to abort a

match and return to the main menu press *F1*, whereas on my copy *F2* did the trick, and if you press the space bar while serving, you can watch the receiver jiggle about on the baseline. Just like real life.

Christina Erskine

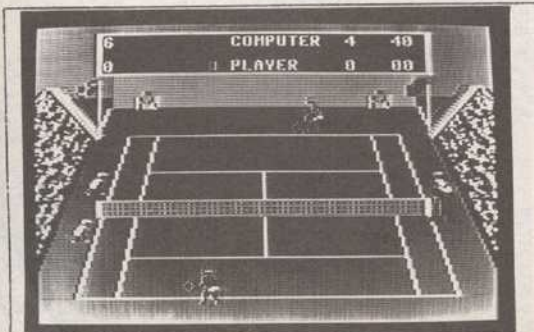


time to complete each task.

Given this element of competition it seems unfair not to be display either score or time counting down. I think most children will feel cheated to suddenly find that the mirror 'shatters' because time has expired. And the use of the cursor keys is bad for little hands — why not user-definable ones?

Given these rather major reservations, the game should serve its purpose providing there is suitable parental supervision, something the booklet emphasises.

John Minson



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The side assembly actually comprises two "conveyor belts" operating simultaneously — one for the left-hand side, one for the right.

The finished frames are picked off the assembly line by a Niko arm and hand device, and transferred on the next gantry to the next gant.

The assembly of the Sierra underbody is carried out independently from the side assembly — the two parts being brought together when the main

The movement of the Sierra panels along the lines is controlled electronically, so that the panels pause long enough at each UTD for it to spot-weld the relevant points.

The robots vary in size, from the small, Topo-sized Ascas to the hulking Chima-

ns, which deal with the main welding, the

ment to the workers who were previously on the assembly lines. Most are floor-mounted, but some hang from ganties about five feet above ground level.

The Sierra robots act as a direct replacement to the workers who were previously on the assembly lines. Most are floor-mounted, but some hang from ganties about five feet above ground level.

UFD, but much of the spot-welding is still done with a portable welding gun wielded by hand.

Piesta models are also finished off by UTD, but much of the spot-welding is still done with a portable welding gun wielded by hand.

The first computer controlled UTDs were introduced in 1981, for the launch of the Sierra, successor to the immensely popular Cortina range of cars. The entire body construction of the Sierras is fully automated, untouched by human hand.

The world robot conjures up images of the all-walking, all-talking machines Professor Searle decried and the staff at Ford prefer for some reason best known to themselves to call their robots UTDs, or Universal Transfer Devices.

There are 42 Kuka models, and the same number of Ninkas, which are German manufactured, 12 Swedish Asca robots, and 24 Chimas, which, surprisingly enough, are made in the US. And that's just in body construction.

"Ford uses four different makes of robot," Dave explained. "There are 42 Kuka models, and the same number of Ninkas, which are German manufactured, 12 Swedish Asca robots, and 24 Chimas, which, surprisingly enough, are made in the US. And that's just in body construction."

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I met Dave Hutchinson, Dagenham's manufacturing engineering manager, for a tour of the body construction complex, and a close-up view of the robots themselves.

The assembly plant is so vast — some 2½ million square feet — that walking round it is out of the question. We travelled by electric car.

used in body construction of the vehicles are produced each day, 127 robots are used in body construction of the vehicles alone.

At Ford's massive Dagenham plant, for instance, where up to 1000 Sierra and Fiesta cars are produced each day, 127 robots are used in body construction of the vehicles alone.

But industrial robots have been around for a long time, and have reached a startling degree of sophistication.

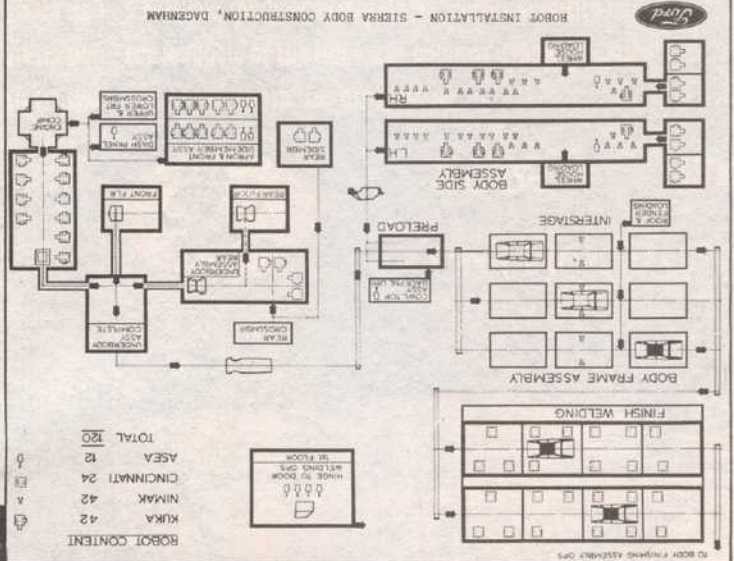
and in the US.

Androbot's Topo device, for example, was the first robot to take shape on its own in the home robot industry.

It certainly is. "The home robot industry has so far been a bit of a flop — and Androbot's Topo device, for example, was the first robot to take shape on its own in the home robot industry."

most are constructed as giant arms, set at last operation in the body construction plant.

Most are constructed as giant arms, set at last operation in the body construction plant.



assembly faults in the operation."

the form of a small grey wire attached to the end of the Asca's arm — this checks for any

sealing, the men on this job were always getting sealer over themselves. The Asca doesn't miss and gets the quantities right each time," said Dave. "Our own technical engineers also fitted an electronic sensor in

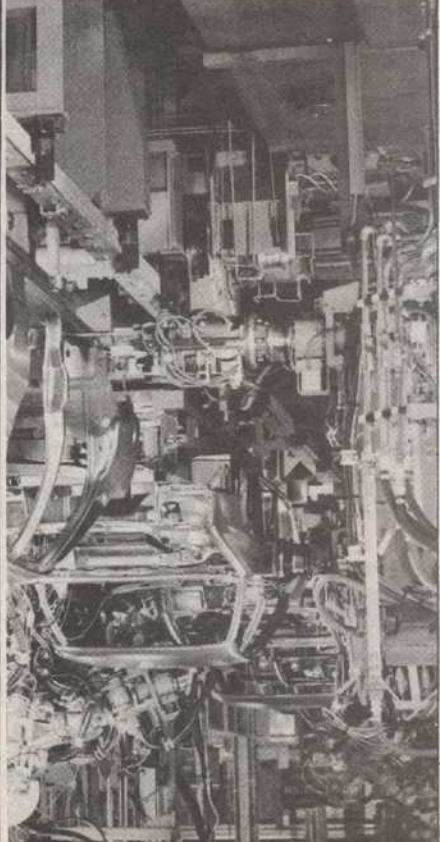
the 100 yard-long side-frame assembly line. The side panels themselves are made by Fat subsidiary Comau, and are loaded on mounted Kukas and Ninkas spot weld the joints together as the frames pass through so on. After welding, the frames then have a sealer sprayed on by a smaller Asca robot.

"Before we had the Asca doing the sealing, the men on this job were always getting sealer over themselves. The Asca doesn't miss and gets the quantities right each time," said Dave. "Our own technical engineers also fitted an electronic sensor in

the 100 yard-long side-frame assembly line. The side panels themselves are made by Fat subsidiary Comau, and are loaded on mounted Kukas and Ninkas spot weld the joints together as the frames pass through so on. After welding, the frames then have a sealer sprayed on by a smaller Asca robot.

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Welding by West Ham

Christina Erskine grapples with the giant robots at Ford's Dagenham car assembly plant

"Some were named after daughters of the floor workers."

The final operation to take place in the body construction area is quality control. Before leaving in an elevator for the first floor to have the doors and boot lids fitted, the underbody is placed on a large pressure sensitive 'bed'. Electronic sensors connected to a Hewlett-Packard computer check the position of each specific component. The charts produced from the computer immediately show if anything has been finished incorrectly — even a millimetre out of alignment can be detected.



Dave Hutchinson

The robots do not stop here with the assembly of the main body — the paint shop is also now fully automated too.

First the entire body frames are cleaned, degreased, electro-coated — to prevent corrosion — sealed at the joints, and cleaned again, to remove any lingering dirt or dust. Surprisingly, here the final cleaning is done using ostrich feathers. Robot ostriches? Apparently not.

Ostrich feathers are expensive, but last about a year before they need replacing. Their electrostatic properties make them the best for the job — far better than the plastic strips used in an automatic car wash.

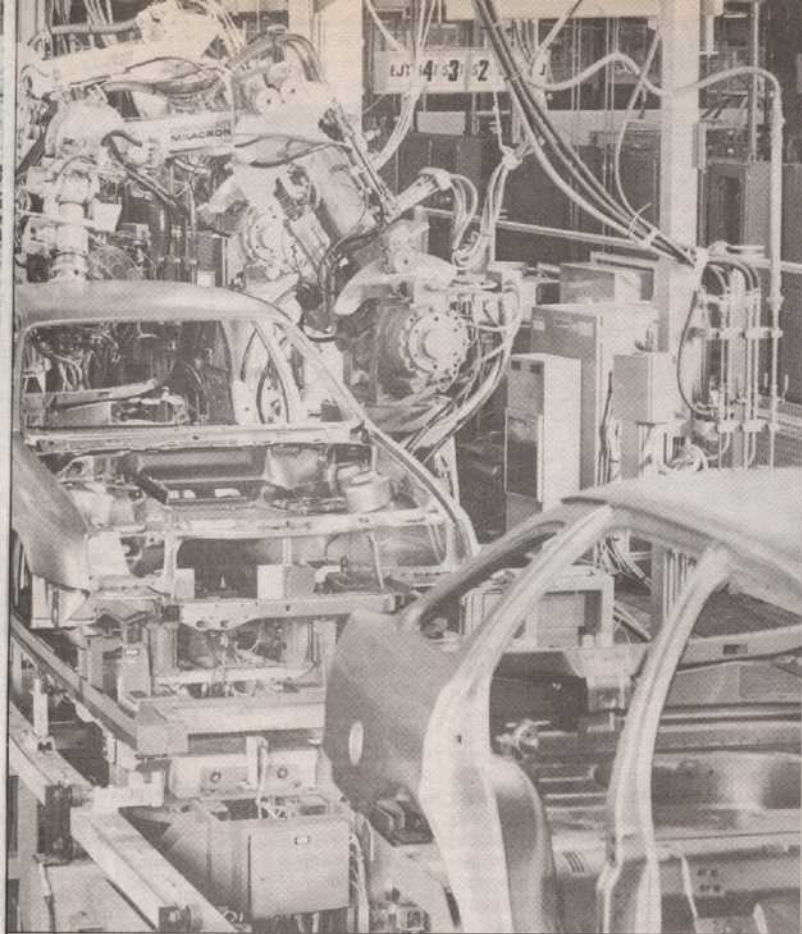
The robots are allowed the last word though — they apply each of the seven coats of paint applied to the Sierra models.

The Sierra assembly line in the Dagenham plant is the most technologically advanced in the country. The cost of all the robots now installed on the line amounts to some £250m.

"We went by the robot route to save on constant labour costs and become more efficient," said Dave. "Obviously though we still need the staff to supervise and maintain the robots."

The question of how the robots have taken over from manpower is inevitably a touchy one. In the 1970s — pre-robot days — there were about 50 people working on side-frame assembly alone. Today that number has been whittled down to a fifth. And robots don't have salaries and paid holidays.

Ford maintains that such automation has had to be introduced in order for the company to remain competitive.



frame is constructed.

With the underbody, Kuka robots are again used for spot welding. "These are what we call hard automation robots, because they can't be reprogrammed," said Dave.

"The Kukas you saw on the side assembly are all reprogrammable — you can alter the speed at which they work, the number of spot welds they make, and so on. A separate hand-controlled unit can be plugged in, and the new motions gone through, physically, using the unit. Then you press a button, and the movements are stored in the robot's memory. The new programs are generally stored on tape and two back-up copies made.

"However, the underbody construction is all done with hard automation — the main panel is loaded in at the start, the rear and front floors and engine compartment are then spot welded on to complete the assembly. An electronic signal is also sent to the underbody assembly section to determine whether the components are to be set up for a left-hand or right-hand drive car.

"Automatic transfer devices, similar to the Niko 'hand' pick up the completed underbody — the part we call the 'marriage' — and bring it together with the side frames for the main body-frame assembly.

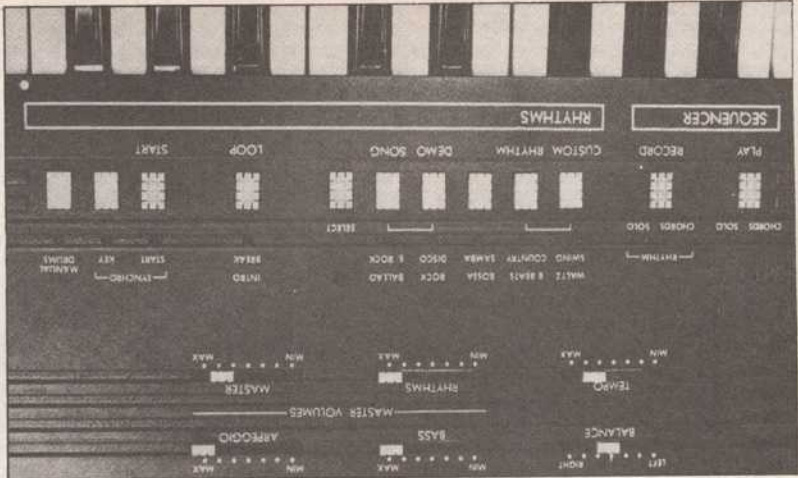
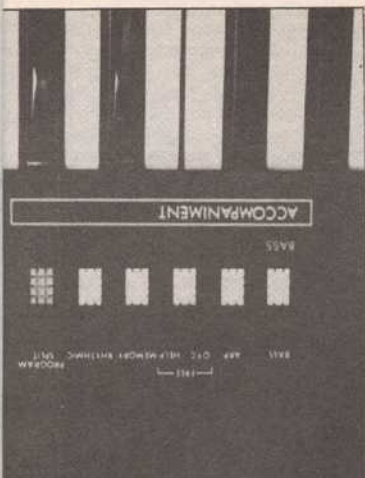
"The main body-frame assembly is still done by hand," admitted Dave. "We simply haven't found a better way yet. The staff on this line use simple clips to attach the roof panels, each side panel and the underbodies together."

Next the assembled Sierra bodies begin their trip down the long line of bulky Cincinnati robots to finally weld the frames together.

The 24 Cincinnati robots which finish off the welding are the most powerful. Standing about six feet high their precise movement is controlled by computer-operated hydraulic pistons and activators — rather than by electric motors. Whereas the spot-welding and clipping, up till now, has only involved the minimum number of connectors and robot movements to hold the frames together at this section of the line, the Cincinnati giants provide the main strength welding finish.

They were among the first robots to be used by Ford and are the only ones at Dagenham to have been given names — two are called Sarah and Anne and those on the second line are called after football teams — West Ham, Arsenal and Fulham.

Intrigued, I had to ask. "It was one way of making the robots seem less threatening when they were installed," Dave explained.



There are two ways of looking at the Siel MK300, as an instrument in its own right and as a computer controlled MIDI keyboard. This being a computer magazine, we'll zoom through the former and look at the latter in more detail.

What you get for £449 is a five octave full size keyboard with ten preset sounds, ten rhythms, a sequencer which can remember 50 chords and 280 notes and various autoaccompaniment features.

A feature which enables two presets to be played at once on the same note makes some of the basic sounds pretty impressive. Even the basic sounds pretty impressive, as is often the case, can be improved by sustain and detune features.

The rhythm section is good. Digital sounds lift it way above the thin trinds and clicks usually associated with built-in drum units. There is also the facility to create your own rhythms guided by a metronome pulse — very effective and useful.

Any of the features may be recorded into the sequencer and will loop round endlessly to provide a simple backing for solos. All in all, it is the elder brother to all those little Casio keyboards, incorporating many of the same features, a few of the limitations, but mostly having much more impressive sounds and rhythms.

But the MK300 has MIDI and as such can be linked to a home computer via Siel's MIDI interface unit (£89) and controlled by computer software — at present there are two packages for the Commodore and one for the Spectrum. A BBC MIDI interface is due as is some BBC software.

I looked particularly at Siel's two packages for the Commodore — the *Midi Multitrack Composer* and the *Live Sequencer*. The *Composer* is some way towards musical notation which is clearly intended for computer novices rather than experienced musicians. In other words you don't get staves, crochets and quavers. Instead,

know that the real money is not made from professional musicians but rather from dabblers, amateurs who know a little music but want to learn more and who want to be able to crank out a few tunes at parties. Casio tried many different techniques to help people learn music; some of their instruments had little lights — that lit up above each note on the keyboard as the note stored in its memory was played — the idea being that you would try to 'follow' the lights and thereby learn the tune. Other features, like one-note chords and auto accompaniment to your single line guitar, accompaniment to your single line guitar, gave an automatic, if rather base lines gave an automatic, if rather spark which ignites a whole new area of computer music development.

The problem for computer owners is, that so far the jump into MIDI has simply been too expensive, whatever their interest in music. Until recently the cheapest MIDI equipped keyboard has been £700 at least. However, the new Siel MK300 is a MIDI keyboard for just over £400 — not much more than a good printer. It's a big step on the way to a peripheral as a joystick or light pen.

A synthesiser can give the current crop of computer musical possibilities they could never otherwise possess. Not only ergonomically — you can't play a Qwerty keyboard with any finesse — but also in terms of the quality and range of sounds available. The synthesisers on the market now are capable of such perfect mimicry of acoustic instruments that it's often difficult to tell the difference. Sound chips on available computers are capable of only three or, at best, four channels of sound. This last point means, basically, that you cannot even play simple chords.

But whilst all this is a pro-synthesiser argument, why involve the computer at all? Why not just buy the instrument? Time to look at the other side of the coin.

Casio and other manufacturers of cheap musical keyboards have spent much time, effort and money making those instruments as easy to play as possible. Casio and co.

For musicians finding a computer to a keyboard allows a freedom similar to that provided by wordprocessors to writers and typists previously accustomed to typewriters. Software packages can (and, in at least one case, do) allow for multi-part composition with instant playback of one or all parts. Sections of music can be rearranged, moved about, assigned to different instruments, and money making those instruments as easy to play as possible. Casio and co.

For educational purposes you get more control with a computer in absolute terms. You get more flexibility in the sense that you can cover those areas you are most doubtful about in greater detail and at greater length. Equally it becomes harder for you to cheat — the computer can ensure that you understand some musical point before allowing you to continue.

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notes are notated with their letter and a number to indicate which octave you require, eg, C4 equals C in the fourth octave. The = and the \$ sign are used to indicate sharp and flat respectively. Note length is expressed as fractions of 96, so a quarter note has a duration of 96/4, ie, 24.

Tunes are created on one of six tracks (like a single line of monophonic, ie, single note music) which are then assigned to Midi channels. More than one track may be assigned to each Midi channel and in this way chords may be created using combined single tracks together.

Individual notes may be made staccato or legato by adjusting the 'gate on time' figure — basically slightly adjusting this figure makes the note a little longer or shorter without affecting the 'clock'.

Each track of music may be edited — notes may be removed, added, note lengths changed and so on, tracks may be saved to disc, loaded in, renamed or erased under your command. What does this mean in terms of the MK900?

The keyboard has two Midi channels: 0 and 1. This means that it can have two 'streams of information' operating independently at the same time. If that sounds confusing it isn't, since in practice two Midi channels means that at any given moment two sounds may be used and within each sound the six tracks may be allotted. For example, by assigning tracks one to four to Midi 0 and tracks 5 and 6 to Midi 1 you have set up an arrangement whereby one sound (say, organ) can play chords, up to four notes and the other sound (say, synth) can play up to two notes on a lead line. I should add that whilst the computer is playing the keyboard you can still join in, using the same sounds.

On the Commodore you are provided with a total of 9000 notes to play around with, 1833 over the six channels, enough for anything short of *The Ring Cycle*. The C4, B3=, D5 notation is obviously pretty irksome to tap into the keyboard but if, like me, your musical compositions don't get much beyond three note chords and one

note lead lines it shouldn't be too much of a problem.

The live sequencer is, in a way, the Composer from the other end. Here you set up the program to receive information and play the keyboard. The border flashes as each note is 'received' by the computer, although all that is recorded is the note information, not the particular tone you have set — you can change that as you wish.

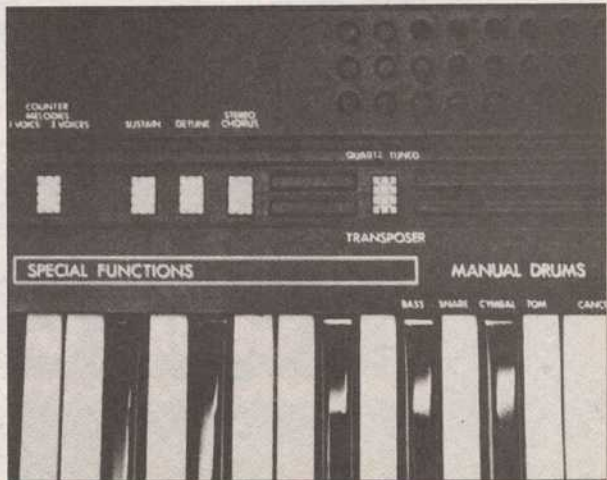
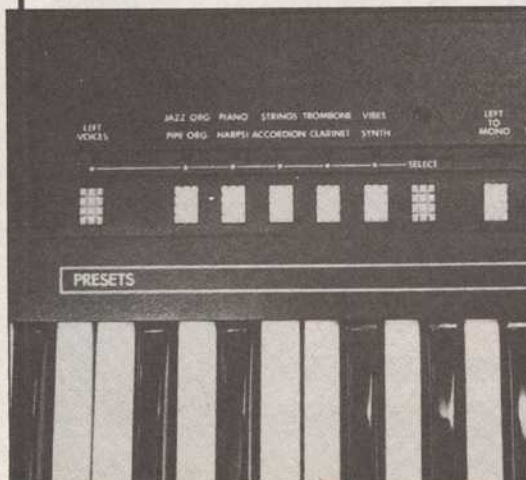
The recorded notes are assigned to a given track and may be played back through the keyboard at a faster or slower speed. New tracks may be recorded and also played back — the effect is very much like having a multi-channel tape recorder with extensive over-dub facilities.

Obviously entering the music with the keyboard is much more convenient than typing in the notes on the Commodore but then you don't get the same degree of editing flexibility. You pay your money... etc, etc. The MK900 is a high quality top-of-the-range portable with enough features and quality sounds to get music that doesn't sound bad with only a little effort. Add a Midi interface and you have, with the right software, an instrument on which you can compose multi-part music, create and replay many lines of melody and generally tinker to your heart's content.

The MK900 lacks two things; firstly it has presets and thus the sound creation is limited and secondly the Midi standard allows for the communication of velocity (how hard you hit the keyboard) but the MK900 is not a velocity sensitive keyboard. In this sense, buying the MK900 is not letting you use all the Midi features possible.

For my money the MK900 is the ideal instrument for those who want a starting point with computer music but aren't too worried about limited sounds and don't want to risk too much money. The auto features are particularly useful and with the software packages that will surely come, sophisticated and impressive arrangements can be created.

Graham Taylor



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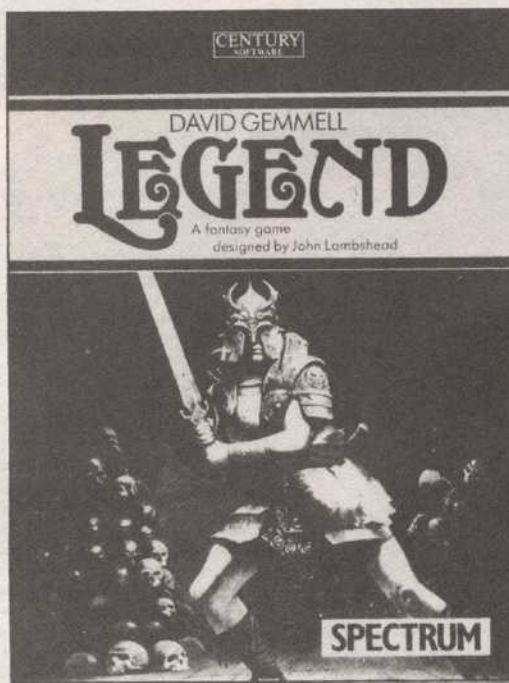


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Compatible

Hardware Saga I Emperor Micro
Spectrum Price £54.95 Supplier
Saga Systems Limited, Woodham
Road, Woking, Surrey.

I has always annoyed me that so called 'professional keyboards' for the Spectrum have fallen short of anything that could really be used to obtain respectable typing speeds. Admittedly this is primarily the fault of the hopeless double shift and extended modes of the keyboard entry system. These present manufacturers with endless headaches if they want to provide a board that allows one keypress access to the various punctuation marks.

As I understand it, Sinclair themselves had to resort to special arms within the Spectrum + that physically depress different parts of the membrane to obtain extra keys such as the semi-colon. On first opening the box of the Saga I, I dared to hope that someone else had finally come up with a mechanism for doing the same, as most of the punctuation marks are represented on their own as well as selected functions such as *Edit* and *Delete* that can only be accessed using the shift keys. Disappointingly the system they have used in fact only comes halfway to providing these features as there are no more than relabelled copies of the original key and return the unshifted signal when pressed alone.

The idea is that it is easier to spot and use the most common functions and Saga have provided no less than two cap shifts and four (count them) symbol shifts at usually points all over the board. After some practice you realise that this is a good compromise and makes the use of the keyboard faster and more pleasant. Keys also exist for the unshifted functions *Kun*, *Load*, *List*, *Save* and *Cls*. Here are also extra cursors in some extremely sensible positions on the board which unlike the Spectrum +, return the numbers 5-8 when unshifted so they will be fully compatible with all existing software.

Some aspects of the design are irritating. The colour coding on the keys is inconsistent, with symbol shifted functions being represented in various places in black, red and green. This is not made easier by the fact that the various keywords on the main Qwerty area are very hard to read, being much smaller than on the original Spectrum which uses the area above and below the Qwerty area very hard to read, being an expansion port provided. Thus you can achieve by the simple expedient of providing a hardware switch to control the hardware is compatible although this is not what about compatibility with existing software can also be used, including programs which use nearly all the normal Spectrum memory. This is because the interface permits its own software (which normally uses some of the free Ram) to be overwritten. A special loading procedure allows you to pack in the largest of programs, although you lose the screen display in the process.

Assembly of the new board is as simple as the birth clams, involving only the removal of five screws and the two ribbon connectors of the Spectrum board and replacing them with about eight new screws, the new ribbons and a small clip on the interface. However, the whole system is let down by very poor documentation, which only makes sense once you have figured out for yourself how the thing must go together. It is also complicated by the inclusion of a few extra mysterious screws and clips which I assume are for the other Saga peripherals, such as a sound amplifier that fits inside the case.

However, these are only minor criticisms and they shouldn't put you off. On the contrary, this is not only the most elegantly designed and styled add-on board for the Spectrum yet, but it is also firmly constructed and an absolute joy to use.

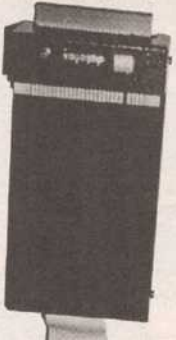
The keys themselves have a very positive feel and the layout is on the whole very good with a nice big space bar and two large

Professional

Hardware Datalax Disc Interface
Micro Sinclair Spectrum Price
£36.25 Supplier Stacom Distribu-
tion Ltd, 18 Grove Road, Sutton,
Surrey

Some months back it seemed as if a whole bunch of disc interfaces were about to be launched for the Sinclair Spectrum. Very few of them actually saw the light of day, partly because of micro-drives and partly because the Spectrum was not designed around a disc operating system.

The Datalax interface, consisting of a strongly-built and quite long black box, is the latest attempt to get around this problem. Designed initially to run with a single disc, it consists of a small cartridge with a ribbon connector that fits into the expansion port provided. Thus you can use a hardware switch to control the expansion port provided. This is not what about compatibility with existing software can also be used, including programs which use nearly all the normal Spectrum memory. This is because the interface permits its own software (which normally uses some of the free Ram) to be overwritten. A special loading procedure allows you to pack in the largest of programs, although you lose the screen display in the process.



Enter keys. I think it knocks spots off the Tony Kettle

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Moving into reverse

An equation converter written for any Spectrum by Richard Armstrong

One of the biggest difficulties in using a language like Fort or Assembly language, is that expressions like $A+B+C=D$ have to be written as $AB+C=D$. This is known as Reverse

Polish (or as it is sometimes known, Postfix) Notation, Converting to Reverse

Polish (or as it is sometimes known, Postfix) Notation can be difficult, especially if dealing with large expressions. Fortunately,

an algorithm produced by a famous computer scientist called Edsger Dijkstra can do the conversion for us. This program is based on that algorithm.

The program is simple to use. Firstly the user is prompted to input the expression he wishes to be translated. The computer then

prints out the corresponding Postfix expression. The program can handle the following operators: +, -, *, /, (,), Or, And.

Operands are represented by the capital letters A to Z.

As an example, the expression $A-B$ And $C+D=E$ would be translated to $AB=CD+E=And$. Note that *And* and *Or* should be entered direct from the keyboard, and not spelled out one letter at a

time. When the prompt 'More? (Y/N)' appears, the user should press Y to translate more expressions or N to end the program.

The program works by considering each element of *As* in turn. If the element under consideration is an operand (A...Z) then it is printed. If the element is an operator (=, +, etc) then its priority must be considered. 'And' and '/' have the highest priority, 'Or', '+ and '-' are the next, '=' being the last. Brackets raise the priority of what is

between them. If the element of *As* is an operator, then operators are removed from the stack and printed until the stack is empty, or there is a left hand bracket on top of the stack, or (finally) the operator on the top of the stack has a lower priority than the element of *As* under consideration. The element being considered is then added to the stack. If the element being considered is a left hand bracket, then this is likewise added to the stack. If, however, the element of *As* is a right hand bracket, then the operators are removed from the stack and printed until a left hand bracket is found.

Program Notes

Time No 10-90
Print instructions and read expression to be translated

130-160 Loop to scan the input expression and call appropriate sub-routines

190-210 A routine to empty the stack
220-270 Decide if more expressions are to be converted

310-360 Print items from the stack until a left hand bracket is found

400-420 Drop an operator from the stack

430-450 Add the operator under consideration to the stack
490-580 Considers the priority of the operator under consideration and prints operators or adds operators to the stack as appropriate

Variables
As - Expression input for translation
Ss - A 'stack' used to store operators
Sp - A 'stack pointer' used to keep track of the end of the stack
A - Loop control variable

```

20 REM INFIX TO R.P.N.
30 LET S#=0
30 PRINT S#
30 PRINT "CONVERSION..."
35 PRINT "INPUT YOUR EXPRESSION"
40 PRINT "AND I WILL CONVERT IT TO REVERSE POLISH NOTATION, REMEMBER TO ENTER 'OR' AND 'AS SINGLES KE YWORDS..."
50 INPUT S#
60 PRINT S#
70 PRINT "IS EQUIVALENT TO--"
80 PRINT "*****"
90 PRINT "*****"
100 REM SCAN INPUT EXPRESSION *****
110 FOR A=1 TO LEN S#
120 REM *****
130 IF R$(A) <="Z" THEN PRINT R$(A);
140 IF R$(A) <="(" AND R$(A) <=")" THEN PRINT R$(A);
150 IF R$(A) <="=" OR R$(A) <="/" OR R$(A) <="+" OR R$(A) <="-" THEN PRINT R$(A);
160 IF R$(A) <="(" THEN GO SUB 40
170 IF R$(A) <=")" THEN GO SUB 61
180 NEXT A
190 FOR A=LEN S# TO 1 STEP -1
200 NEXT A
210 PRINT S#(A);
220 NEXT A
230 PRINT "*****"
240 PRINT "*****"
250 IF INKEY$ <<"Y" AND INKEY$ <>"N" THEN GO TO 260
260 IF INKEY$ <="N" THEN STOP
270 RUN *****
280 REM *****
290 REM PRINT ITEMS FROM STACK *****
300 REM *****
310 IF SP=0 THEN RETURN
320 IF S$(SP) <="(" THEN GO TO 40
330 PRINT S$(SP);
340 LET SP=SP-1
350 PRINT S$(SP);
360 LET SP=SP-1
370 REM DROP TOP STACK ITEM *****
380 REM *****
390 LET SP=SP-1
400 LET SP=SP-1
410 LET SP=SP-1
420 RETURN
430 LET SP=SP+1
440 LET SP=SP+1
450 RETURN *****
460 REM *****
470 REM DEHL WITH RN OPERATORS *****
480 REM *****
490 IF S$(SP) <="(" THEN GO TO 500
500 IF S$(SP) <=")" THEN GO TO 56
510 IF (R$(A) <="(" OR R$(A) <=")" OR R$(A) <="=" AND S$(SP) <="(" AND S$(SP) <=")" OR R$(A) <="+" OR R$(A) <="-" OR S$(SP) <="(" OR S$(SP) <=")" OR S$(SP) <="=" AND S$(SP) <="(" AND S$(SP) <=")" THEN GO TO 560
520 PRINT S$(SP);
530 LET SP=SP-1
540 LET SP=SP-1
550 LET SP=SP-1
560 LET SP=SP-1
570 LET SP=SP-1
580 RETURN

```

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A useful filing program for Dragon 32 users written by W Patton

This is a program that allows you write your own filing system and have as many fields to a file as you want. It takes up 1.5K of memory and can store up to 300 entries.

The program is split up into several sections; Line 10 prints out the menu, Lines 20 and 30 get your command to go to the corresponding section of the program. Lines 40-90 are used by Option 1 where you are requested to type in the number of fields that the file you are creating requires. You then type in each entry, pressing *Enter* after each field has been typed in. When you want to finish typing, you must type 'XX' as the first entry to your last file.

Lines 100-110 are used by Option 2. These allow you to add more files to the end of your file. You enter data for this the same way as for Option 1 using 'XX' to return to the menu.

Line 120 is used by Option 3 and can be used to correct any mistakes made while entering your data. You are required to first state the file that the error is in, then the field. You then type in the new item and it will replace the old one.

Lines 130 and 140 are used by Option 4. This allows you to insert a file anywhere in the large file. You must type in the number at which you want the file to go in at, then you must type in the new file. Line 150 is used by Option 5. You must type in the number of the file that is to be deleted then that file will be erased.

Line 160 is used by Option 6 where the file is saved. You have to type in the name you want to call the file. After pressing *Enter* you are given a pause in which time you should press play and record on your cassette recorder. Line 170 is used by Option 7; the loading routine. You have to type in the name of the file to be loaded. When the file has loaded you return back to the menu.

Lines 180-200 are used by Option 8; the print out routine. You are first asked if you wish it to go to the screen or the printer. Press any key to step through the file. When all the file is printed out the program waits for you to press *Enter* before returning to the menu. Lines 210-230 are used by Option 9, where a word is searched for in the file. You just type in the word you are looking for in full, and the computer will search through the large file until it finds it.

Variables

A	= Number of fields
Array AS	= All of the file
EO	= Length of file + 1 in memory
XS	= General input
A1	= Value of key pressed
FX	= For next loop variables
N\$	= Name of file to load or save
D	= General input

```

5 CLEAR 10000
10 CLS:PRINT"(1) START A NEW FILE":PRINT"(2) A
DD TO A FILE":PRINT"(3) EDIT A FILE":PRINT"(4)
INSERT A FILE":PRINT"(5) DELETE A FILE":PRINT
"<6> SAVE FILE":PRINT"(7) LOAD A FILE":PRINT"<
8) PRINT OUT FILE":PRINT"(9) SEARCH FOR A WORD
":PRINT"COMMAND"
20 X$=INKEY$:IF X$="" THEN 20 ELSE A1=VAL(X$):
IF A1<1 OR A1>9 THEN GOTO 10
30 ON A1 GOTO 40,100,120,130,150,160,170,180,2
10
40 CLEAR:INPUT"HOW MANY FIELDS";A:IF A<0 OR A>
11 THEN 40 ELSE DIM A$(300,A)
50 PRINT"TYPE 'XX' TO END"
60 FOR F=1 TO 300:PRINT"FILE ";F:FOR X=1 TO A
70 INPUT A$(F,X):NEXT X
80 IF A$(F,1)="XX" THEN EO=F:GOTO 10 ELSE NEXT
F
90 PRINT"FILE FULL":GOTO 10
100 FOR F=EO TO 300:PRINT"FILE ";F:FOR X=1 TO
A
110 GOTO 70
120 INPUT"WHICH FILE";F:INPUT"WHICH FIELD";X:1
NPUT"TYPE IN NEW ENTRY";A$(F,X):GOTO10
130 INPUT"WHERE IS NEW FILE TO GO";D:IF D>=EO
THEN GOTO 10 ELSE FOR F=EO TO D-1 STEP -1:FOR
X=1 TO A:A$(F+1,X)=A$(F,X):NEXT X,F
140 EO=EO+1:PRINT"TYPE IN NEW FILE":FOR X=1 TO
A:INPUTA$(D,X):NEXT:GOTO 10
150 INPUT"WHICH FILE IS TOP DELETED";D:IF D>=
EO THEN GOTO 10 ELSE FOR F=D TO EO:FOR X=1 TO
A:A$(F,X)=A$(F+1,X):NEXT X,F:EO=EO-1:GOTO 10
160 INPUT"NAME TO SAVE FILE UNDER";N$:PRINT"PR
ESS PLAY AND RECORD":FOR F=1 TO 1000:NEXT:OPEN
"0",#-1,N$:PRINT#-1,EO,A:FOR F=1 TO EO:FOR X=1
TO A:PRINT#-1,A$(F,X):NEXT X,F:CLOSE#-1:GOTO
10
170 INPUT"NAME OF FILE TO BE LOADED";N$:PRINT
"PRESS PLAY CASSETTE":OPEN"1",#-1,N$:INPUT#-1,E
O,A:FOR F=1 TO EO:FOR X=1 TO A:INPUT#-1,A$(F,X
):NEXT X,F:CLOSE#-1:GOTO 10
180 INPUT"<S>CREEN OR <P>RINTER";X$:IF X$="P"
THEN D=-2 ELSE D=0
190 FOR F=1 TO EO-1:PRINT#D,F:FOR X=1 TO A:PR
INT#D,A$(F,X);":NEXT
200 IF INKEY$="" THEN 200 ELSE PRINT#D:NEXT:IN
PUT"ENTER TO RETURN";X:GOTO10
210 INPUT"TYPE IN WORD";X$:FOR F=1 TO EO:FOR X
=1 TO A:IF A$(F,X)=X$ THEN 230 ELSE NEXT X,F
220 PRINT"WORD IS NOT THERE":INPUT"ENTER TO RE
TURN";X:GOTO10
230 PRINTF:FOR X=1 TO A:PRINTA$(F,X);" ";NEX
TX:PRINT:INPUT"PRESS ENTER TO RETURN";X:GOTO10

```

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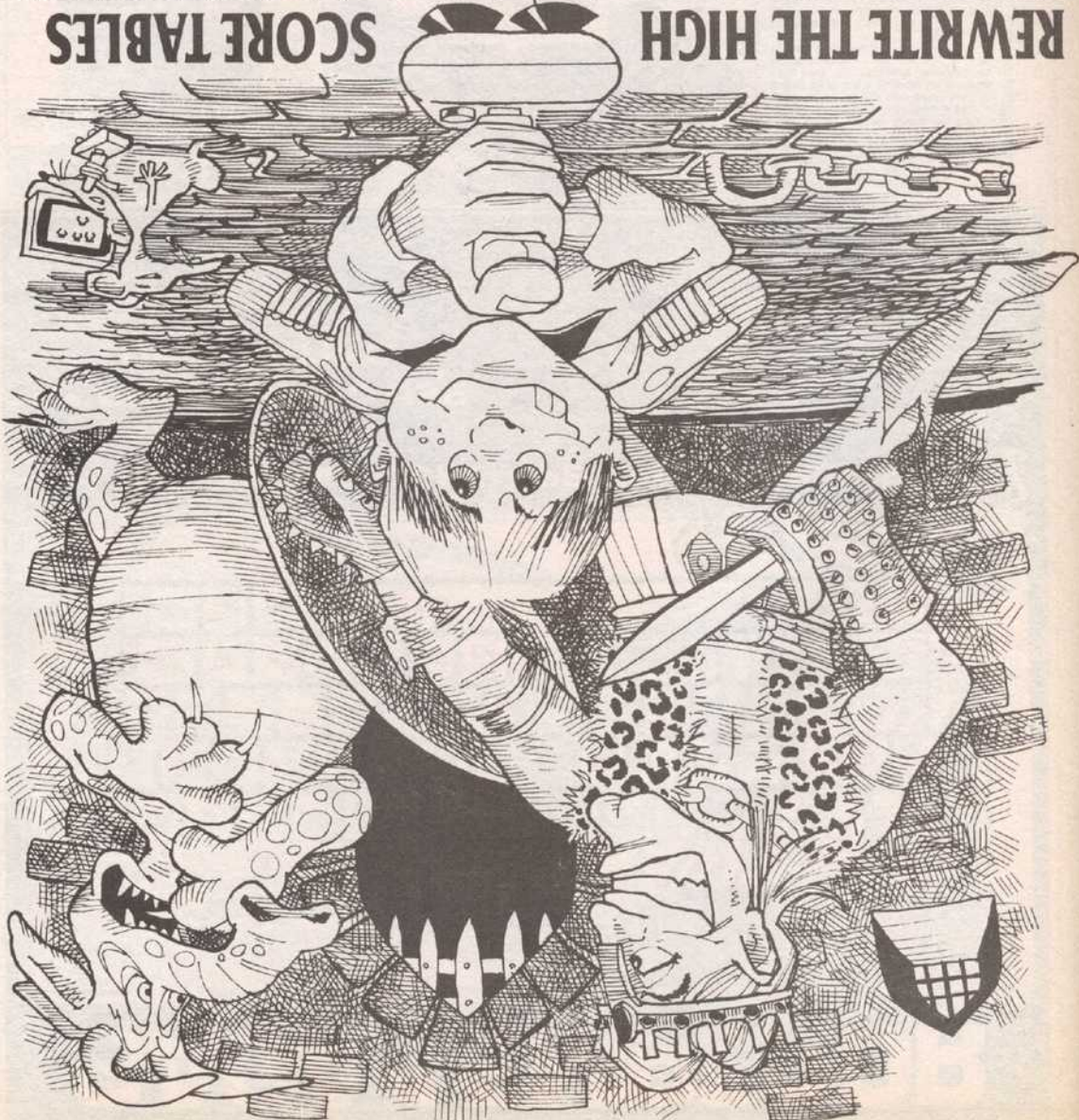
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REWRITE THE HIGH SCORE TABLES



In the parallel universe

Perfect Parallel Printing on the Commodore 64 courtesy of Adrian Warman

As many users of Commodore equipment will be aware, little provision is made for those who wish to use non-standard equipment, such as Centronics-equipped printers. A growth market for CBM users is the Parallel Printer interface package, which can range from cheap cable and minimal software, up to expensive hardware add-ons that do everything and cost a corresponding amount.

A typical software interface will come with a short cable to connect from the User Port to the Centronics Printer, and a small piece of machine code software. This software will usually reside in the spare Ram from \$C000 to \$CFFF, since this is untouched by Basic. Modifications are made to the Kernal vectors so that any attempt to access a given device number (say six) will re-directed out of the User Port as a parallel *Ascii* code.

Unfortunately, another growth market, extending the Basic on the CBM 64, also tends to produce packages which *also* use the \$C000 Ram. Such a package is the Simons' Basic cartridge, which uses the Ram for a variety of purposes, including Function Key definition. This means that if you want to have a worthwhile language, you may well be unable to use your Parallel Interface Program.

This article lists and describes a reasonably short Basic package which will drive a parallel interface, as long as you have a suitable connecting cable. The routines are detailed, and could be easily converted for use under other languages. For example, the extremely comprehensive Pascal Compiler from Oxford Computer Systems does not support parallel printers, so using the listed routines it is an easy job to define suitable procedures in Pascal to perform all necessary tasks.

The routines supplied are a little slower than machine code equivalents, and they do not check to ensure that the device is present and connected; however, they don't require any of the file channels, leaving them all free for other purposes.

The package consists of three subroutines. One is used to configure the CBM Input/Output chips to control the data lines. The next is used to place an *Ascii* character onto the data lines (and hence send it to any listening device). It will then wait for an acknowledgement that the character has been received. The last routine will restore the CBM I/O chips to prevent the parallel device being accessed further.

As an example of the routines used, a short program is added to the front of the listing which prints out the *Ascii* characters

from number 32 to number 127 inclusive.

Program notes

Line 140

This line calls the subroutine which will perform the equivalent of Basic 'OPEN' instruction. Since no 'file' is being used, no file number needs to be given.

Line 150

This is the start of the loop to print out the ASCII characters from 32 to 127 inclusive.

Line 160

The subroutine to output characters assumes that the ASCII code is stored in variable CHAR. If you wanted to use literal characters, you could use something like: Char = Asc ("a").

Line 170

This line calls the subroutine which will perform the equivalent of a Basic Print#x, Chr\$(y); instruction. Note that (as stated above) no file is used, and so no file number is required. In addition, the semicolon after the print instruction is always implied. Thus, to simulate a

continued on page 51

```

100 REM BASIC PARALLEL PRINTER
ROUTINES.
110 :
120 REM BY A. WARMAN
130 :
140 GOSUB 60010
150 FOR X=32 TO 127
160 CHAR=X
170 GOSUB 60190
180 NEXT X
190 CHAR=13
200 GOSUB 60190
210 GOSUB 60110
220 STOP
230 :
60000 REM OPEN TO PRINTER.
60010 CIA2=56576
60020 POKE CIA2+3,255
60030 POKE CIA2+1,0
60040 POKE CIA+2,PEEK(CIA2+2) OR 4
60050 POKE CIA,PEEK(CIA2) OR 4
60060 POKE CIA2+13,16
60070 RETURN
60080 :
60090 :
60100 REM CLOSE ACCESS TO PRINTER.
60110 CIA2=56576
60120 POKE CIA2+13,0
60130 POKE CIA2+3,0
60140 POKE CIA2+2,PEEK(CIA2+2)
AND 251
60150 RETURN
60160 :
60170 :
60180 REM PRINT OUT CHARACTER
^CHAR^.
60190 CIA2=56576
60200 POKE 49152,PEEK(CIA2+13)
60210 POKE CIA2+1,CHAR
60220 POKE CIA2,PEEK(CIA2) AND 251
60230 POKE CIA2,PEEK(CIA2) OR 4
60240 IF (PEEK(CIA2+13) AND 16)=0
THEN GOTO 60240
60250 RETURN
    
```

ORIGINAL SOFTWARE DESIGN

U R O M S O F T



Munter

Jeff

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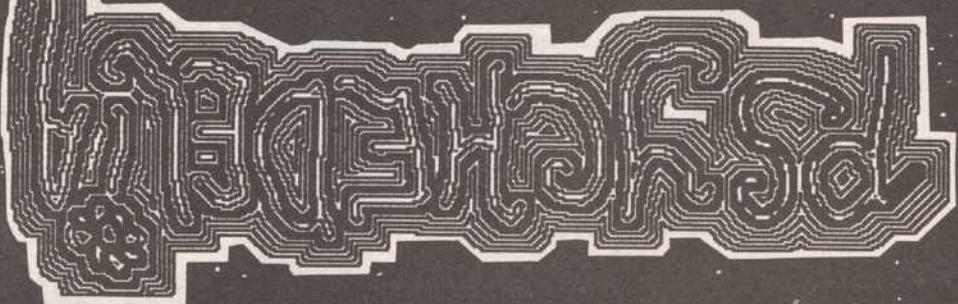
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Commodore 64

Print#x instruction (which would simply print a carriage return), you should use: *Char = 13:Gosub 60190*.

Line 180

Go and do the next character (if there is one to do).

Lines 190-200

Output an *Ascii* carriage return <CR> character. This corresponds to the *Print#x* as described above, and on most parallel printers ensures that any text left in the input buffer will be printed.

Line 210

This line calls the subroutine which will prevent the I/O chips from trying to access any parallel devices on the User Port, by restoring default values. Halt the demonstration program.

Line 220

Halt the demonstration program.

Lines 60010 - 70

These lines are responsible for configuring the I/O chips to access the User Port in a manner suitable for controlling a parallel Centronics device. In its absolute minimum configuration, a parallel Centronics port requires eight data lines (called a 'bus'), a *strobe* line to show the parallel

device when the data on the bus is valid, and an *acknly* line to show when the parallel device has accepted the data. The 8-bit bus is set up using Port B of *CIA#2*, which connects directly to the User Port (program lines 60020-60030). The *strobe* line is bit two of Port A (program lines 60040-60050). Finally, the *acknly* line is set up using the *Flag* interrupt on *CIA#2* (program line 60060).

Lines 60010 - 140

These lines deselect the I/O chips to prevent them accessing the parallel device. The *acknly* line is disabled so that it can no longer be read (program line 60120). Each of the 8 lines on the data bus is restored to an input line (program line 60130). Finally, the *strobe* line is redefined as an input line (program line 60140).

Lines 60190 - 250

The key lines of the package. First, a read of the *acknly* line must be made, in order to check it later (program line 60200) — for the reason, see the *Programmers Reference*

Guide. Note that the data returned is placed in location 49152 simple for convenience! If you wish, you could replace program line 60200 with (say): *Let A = Peek (CIA2+13)*.

Next, the actual *Ascii* code is placed on the data bus (program line 60210). The *strobe* line is switched to show data ready (lines 60220-60230). Since the device may have a delay (such as moving the print head back to the next line), the program must wait for an acknowledgement via the *acknly* line (program line 60240). Once this has been completed, the character has been sent and received, so we can exit the routine.

Hopefully, you should now see how to modify your own programs in order to incorporate the parallel interface routines. However, this does *not* get over the fact that a connecting cable is still required. Fortunately, these are available as stand-alone items from advertisers in magazines such as this esteemed paper!

Competition result

Flight Competition winner

The winner of the Flight Simulation Competition we ran in the September 6 issue is Simon Watson, aged 19, from Harlow in Essex.

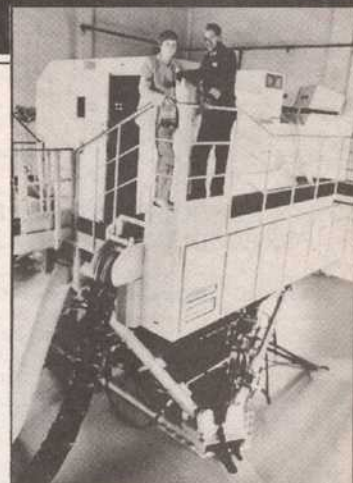
Last week he was awarded his prize — a chance to fly a real flight simulator used to

train commercial airline pilots at British Airways' Cranebrook training centre at Heathrow airport.

British Airways operates three flight simulators at Cranebrook, each of which stands about 40 feet tall and costs a staggering £10m apiece. The machine which Simon spent around two hours flying was a Boeing 757 simulator — a faithful reconstruction of the 757's cockpit supported twenty feet above the ground on powerful hydraulic rams. These are

controlled by two Vax mini-computers to move the cockpit according to the pilot's commands to accurately reproduce the effects of take-off and landing. The illusion is completed with four monitors suspended above the cockpit windows, projecting a high-resolution computer-generated picture of the runway, surrounding buildings, roads and skyline.

It was something of a surprise to discover that Simon already has some flying experience. He hopes to make flying his career and as a first step he



is trying to get private pilot's licence allowing him to fly light aircraft. Even though he has done some flying he has never tried to learn to drive — he says he couldn't afford to do both.

After his two-hour 'flight' he persuaded British Airways' Boeing Training Captain, Roger Benham, to log the simulator 'familiarisation' in his flight record.

Now Simon is looking for a sponsor so that he can continue with his ambition to become a commercial helicopter pilot.



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POW!

Games Designer Competition

Design an
arcade Game!

Think you can design an arcade game? This is your chance to put all those great ideas into practice. We want you to design the sequel to Elite's *Kokotoni Wilf*.

Kokotoni Wilf from Elite Software — one of this Autumn's top selling games on both the Commodore 64 and the Spectrum is to have a sequel. The plot? — that's for you to decide!

Popular Computing Weekly offers you the chance to use your own ideas, characters, plot and so on to create the sequel to *Kokotoni Wilf* which will be published by Elite in the new year.

The winner(s) will be credited with the storyline design in all advertising and promotion, and the winner(s) name(s) will be featured in the packaging. In addition, a royalty of 6% of sales achieved will be paid to the winning designer or design team.

What we want you to do

The competition is open to both individual designers or design teams. You are not asked to actually program the game. All you have to do is to prepare a storyboard — a series of screen drawings or sketches — for the sequel which should explain the action from the first screen to the last.

The finished storyboard should be detailed enough for Elite's programmers and designers to use without any major changes — set yourself a limit of no less than 20 screens of action and no more than 60. It might be helpful to divide your storyboard into two sections, a general guide to the story including overall objectives and method of scoring, etc (limit yourself to a maximum of 800 words). The second section should be much more specific detailing exactly what is going on where in each screen, indicating such things as sprites, background layout and movement paths. To help you, we show on the right one such storyboard from a screen in the first *Kokotoni Wilf* program.

How to enter

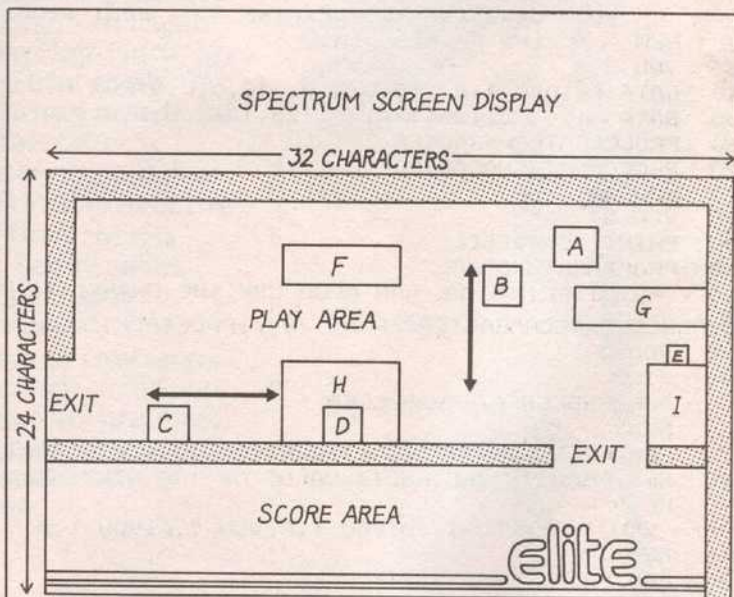
Completed storylines and storyboards should be submitted to *Kokotoni Wilf* Competition, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP, to arrive no later than 1 January 1985.

All entrants requiring an acknowledgement of receipt should submit a stamped self-addressed envelope. Entrants requiring their work to be returned after judging should send a suitable post paid self-addressed envelope with the entry.

The judges decision will be final. Don't forget to include your name and address! Ten runners up will receive copies of the game which will be produced for the Spectrum and Commodore 64.

It is important to remember that the program you create is to be a sequel and so, in a general way, you should maintain the theme and atmosphere of the original. For anyone not familiar with *Kokotoni Wilf* here is the story so far:

"Legend has it that many hundreds of years ago somewhere in Northern Europe lived a great Magician known as Ulrich. Ulrich knew of a magic amulet, fragments of which had been scattered throughout time. Ulrich wished to wield its power, but he was too old and infirm for such an arduous adventure and so charged his protegee Kokotoni Wilf with the epic task. Ulrich sent Wilf back in time to the age of the great dinosaurs, there to begin his quest through the ages for each fragment of the Amulet. Ulrich has provided Wilf with magic wings and time gates to pass from age to age — your task is to guide Wilf in his epic quest."



TIME-ZONE 3 : SCREEN 1

A : STARTING POSITION OF KOKOTONI WILF

B : STARTING POSITION OF 'BOOK' SPRITE

C : STARTING POSITION OF 'BOILING POT' SPRITE

D : ANIMATED 'FIRE' SPRITE

E : LOCATION OF AMULET FRAGMENT

F, G, H, I : SKULL SHELF; POTS SHELF; OPEN RANGE; SKELETON.

BOLD ARROWS SHOW SPRITE MOVEMENT PATTERNS.

SHADED AREA SHOWS IMPENETRABLE BORDERS.

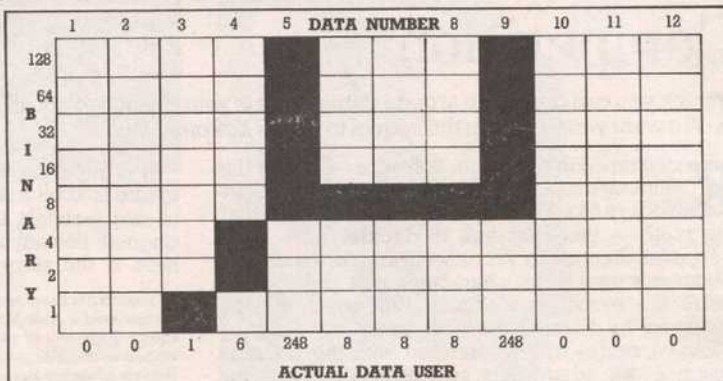
Reform your character

User-defined graphics on your Epson made easy on the BBC B by A. Fennell

This program allows you to produce User Defined Graphics on the Epson FX80 printer. The character is defined on an 8 by 12 grid (see right) — as explained in the printer manual — and these values are stored in the Data statements at Lines 40 & 50.

The first numbers are the *ASCII* codes for the characters to be changed, ie [=91. Any character could be used.

As I have shown in the program, the UDG can be used with normal characters (once it has been defined) but the printer must be set back to the original character set, using *Proccbacktonormal*, (see Line 120 for example). I have created a μ and a # sign as examples, but the only real limit is your own inventiveness.



```

10 REM program to produce UDG on the FX-80 printer.see page 3-38
    of manual.produces a mu sign VDU2 enables the printer
    VDU3 disables the printer VDU1 sends next character to
20 REM the printer only
30 VDU 2
40 DATA 64,0,0,1,6,248,8,8,8,248,0,0,0:REM @ => MU ON PRINTER
50 DATA 91,0,36,126,126,36,126,126,36,0,0,0,0:REM [ => £ ON PRINTER
60 PROCCREATECHARACTER
70 PROCCREATECHARACTER
80 VDU 3
90 VDU 2
100 PRINT "@@@@IIII"
110 PROCCBACKTONORMAL
120 PRINT:PRINT "WE CAN ALSO USE THE CHARACTER ";:RESTORE
40:PROCCREATECHARACTER:PRINT "@"::PROCCBACKTONORMAL:PRINT " IN A SENTENCE"
130 VDU 3
140 STOP
150 DEF PROCCREATECHARACTER
160 REM
170 REM PRINT CHR$(27);"&";CHR$(0);CHR$(£);CHR$(£);
180 REM READ IN THE ASCII VALUE OF THE NEW CHARACTER
190 READ A
200 VDU 1,27:VDU 1,38:VDU 1,0:VDU 1,A:VDU 1,A
210 REM
220 REM PRINT CHR$(139);
230 VDU 1,139
240 REM
250 REM DEFINE THE 8*12 SHAPE FOR THE CHARACTER
260 FOR I=1 TO 12:READ A:VDU 1,A:NEXT
270 REM
280 REM PRINT CHR$(27);"%";CHR$(1);CHR$(0)
290 VDU 1,27:VDU 1,37:VDU 1,1:VDU 1,0
300 ENDPROC
310 DEF PROCCBACKTONORMAL
320 REM return printer characters to normal
330 VDU 1,27:VDU 1,37:VDU 1,0:VDU 1,0
340 ENDPROC

```



Bristles



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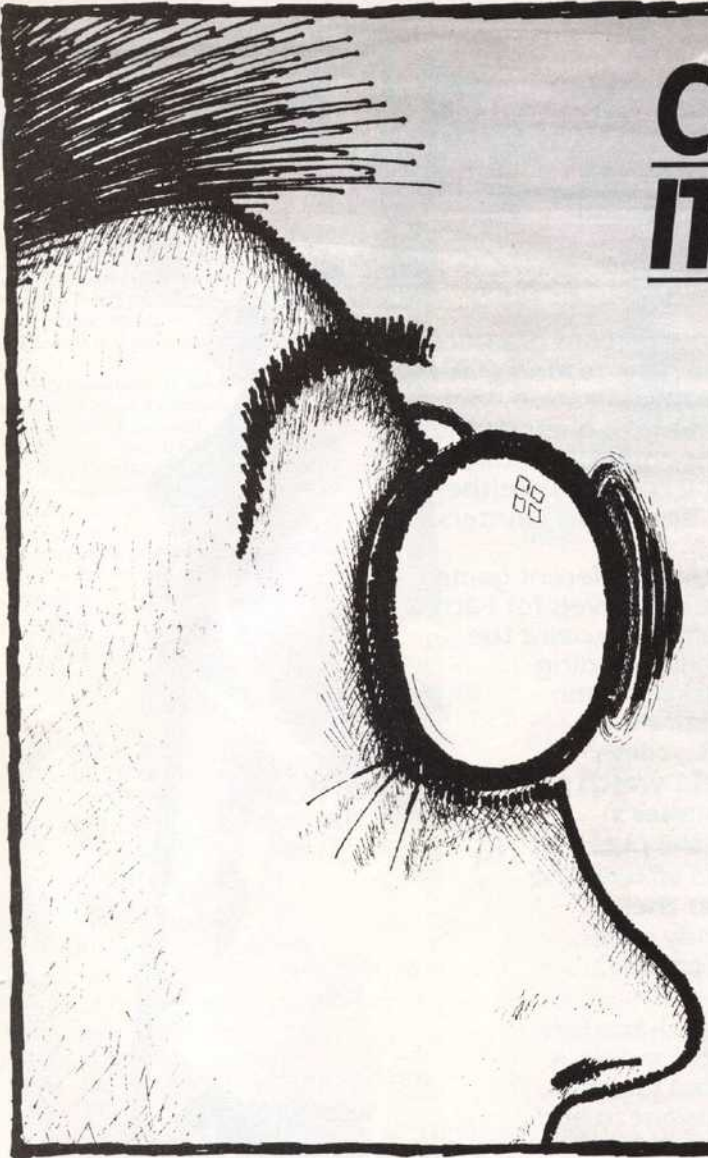
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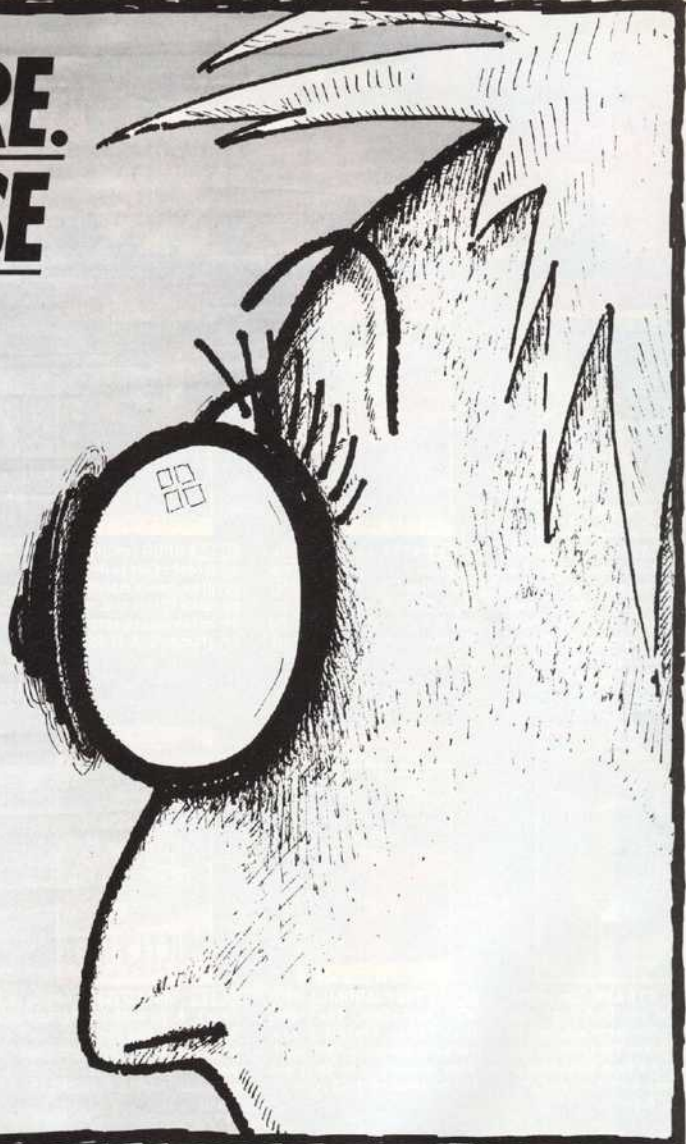
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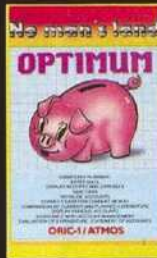
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Routine input

For easier inputting and editing of your data a program from M J Amess

This program consists of one major procedure, called *Cinput*, which provides a convenient method for accepting data from the user's terminal. It provides a number of data formats to allow almost any type of data to be entered and checked for validity.

This routine can reside at the end of your own programs and be called whenever data input is required. It is called by typing *Cinput* and is followed by a list of formal parameters, which will supply data for the procedure. To see what formal parameters are used look at Line 30020 which defines the procedure. The parameters used are, *Row, Col, Max, Min, Types, Old Ink, Old Paper.* *Row* and *Col* define the screen coordinates at which the data is to be accepted. *Max* and *Min* are used to define the maximum and minimum number of characters that are to be accepted by the procedure.

The *Cinput* procedure types periods (.) at the specified screen position to show the user the maximum number of characters allowed (taken from the value entered in the *Max* variable). In case of an error whilst

entering data, messages are displayed in Screen #0.

The most important parameter that must be entered is *Types*. This is a one or two character string defining the type of data to be entered. There are eight main types which are:

- 1) 'D' = Enter a date, in the format DDMMYY. This is edited for a valid Day and Month and redisplayed in DD/MM/YY format.
- 2) 'A' = Alphanumeric. All characters are valid.
- 3) 'I' = Enter any positive integer numeric.
- 4) 'N' = Accept any positive numeric and display it in a monetary form. The numeric is entered without a decimal point. For example, if 10021 is entered this is automatically redisplayed as 100.21.
- 5) 'NN' = Negative numeric. This is exactly the same as the 'N' type except that the numeric entered is changed to a negative. The user enters the numeric as a positive and the computer redisplayes the value as a negative.
- 6) 'Y' = Accept Yes/No or Esc. The computer will await the user to press either the 'Y, N

or 'Esc' keys. Pushing the 'Enter' key will have the same effect as pushing the 'Y' key. 7) 'P' = Accepts an alphanumeric password. This type uses the *Old Ink* and *Old Paper* variables so that any typed data is not displayed in a visible form on the screen. These two variables must be set to the current *Ink* and *Paper* values that are being used.

8) 'V' = Verification — accepts only a carriage return (enter key).

All data which is entered is stored in the variable *Entry*, even numeric data, which can be stored later in a numeric variable.

One final facility is that instead of entering the expected data you may enter *End* (or push the Esc key in the 'Y' option). This sets a variable, *Inxctl*, to 3 which could signify that the user wishes to escape from a particular option within his/her program. During normal use *Inxctl* will be set to zero if the procedure is completed Ok. If 'Y' is pushed in the *Yes/No* field then *Inxctl* is set to 1, or if 'N' is pushed then *Inxctl* will equal 2.

The following is an example of the *Cinput* procedure. Type, *Cinput 10,5,20,5,'A'*.

This will accept any alphanumeric data at position 10,5 on the terminal. The maximum number of characters that will be accepted is 20 and the minimum is 5. Please note that the *Ink* and *Paper* variables need only be entered when using the password option.

```

30000 REMark ENHANCED INPUT ROUTINE
30005 REMark COPYRIGHT 1984 M.J.AMESS
30010 REMark VERSION RS1.0A 19/08/84
30015 REMark ** **
30020 DEFine PROCedure CINPUT(ROW,COL,MAX,MIN,
TYPE$,OLD_INK,OLD_PAPER)
30025 INXCTL=0:CLS #0
30030 IF TYPE$="D" THEN DATE_ENTER
30035 IF TYPE$="A" THEN ALPHA
30040 IF TYPE$="N" OR TYPE$="NN" OR TYPE$="IN"
THEN NUMERIC
30045 IF TYPE$="Y" THEN YES_NO
30050 IF TYPE$="P" THEN PASSWORD
30055 IF TYPE$="V" THEN VERIFY
30060 END DEFine CINPUT
30065 REMark ***** ENTER DATE *****
30070 DEFine PROCedure DATE_ENTER
30075 MIN=6:MAX=6
30080 REPEAT LOOP
30085 ENTER_VALUE
30090 IF INXCTL=3 THEN EXIT LOOP
30095 SET=0
30100 MAX=6:MIN=6 : CHK_LENGTH:IF SET THEN GO
TO 30085
30105 MONTH$=ENTRY$(3 TO 4) : YEAR$=ENTRY$(5
TO 6)
30110 DTE$=ENTRY$(1 TO 2)
30115 IF MONTH$ < 1 OR MONTH$ > 12 THEN SET=1
30120 IF DTE$ > 31 OR DTE$ < 1 THEN SET=1
30125 IF DTE$ > 29 AND MONTH$=2 THEN SET=1
30130 IF MONTH$=4 OR MONTH$=6 OR MONTH$=9 OR
MONTH$=11 THEN
30135 IF DTE$=31 THEN SET=1
30140 END IF
30145 IF NOT SET THEN EXIT LOOP
30150 END REPEAT LOOP
30155 IF INXCTL <> 3 THEN
30160 AT ROW,COL:PRINT DTE$,"/";MONTH$,"/"
YEAR$
30165 END IF
30170 END DEFine DATE_ENTER
30175 REMark ***** ENTER ANY ALPHANUMERIC
*****
30180 DEFine PROCedure ALPHA
30185 REPEAT LOOP
30190 ENTER_VALUE
30195 IF INXCTL=3 THEN EXIT LOOP
30200 SET=0:CHK_LENGTH
30205 IF NOT SET THEN EXIT LOOP
30210 END REPEAT LOOP
30215 END DEFine ALPHA
30220 REMark ***** ENTER NUMERIC *****
30225 DEFine PROCedure NUMERIC
30230 REPEAT LOOP
30235 ENTER_VALUE
30240 IF INXCTL=3 THEN EXIT LOOP
30245 SET=0:CHK_LENGTH
30250 IF SET THEN GO TO 30235
30255 SET=0
30260 FOR VALUE=1 TO LEN(ENTRY$)
30265 IF CODE(ENTRY$(VALUE)) < 48 OR CODE(ENT
RY$(VALUE)) > 57 THEN SET=1
30270 END FOR VALUE
30275 IF SET THEN GO TO 30315
30280 IF TYPE$="IN" THEN GO TO 30315
30285 IF LEN(ENTRY$)=2 THEN ENTRY$="0" &
ENTRY$:GO TO 30295
30290 IF LEN(ENTRY$)=1 THEN ENTRY$="00" &
ENTRY$
30295 LINE$=ENTRY$(1 TO ((LEN(ENTRY$))-2))
30300 LINE$=LINE$ & ",":LINE$=LINE$ & ENTRY$(
LEN(ENTRY$)-1 TO LEN(ENTRY$))
30305 ENTRY$=LINE$
30310 AT ROW,COL:CLS #1,4:PRINT ENTRY$
30315 IF NOT SET THEN EXIT LOOP

```

```

30320 END REPEAT LOOP
30325 IF TYPE$="NN" THEN
30330 ENTRY$="-" & ENTRY$
30335 AT ROW,COL:CLS #1,4:PRINT ENTRY$
30340 END IF
30345 END DEFINE NUMERIC
30350 REMARK ***** SELECT "Y","N" OR ESC
*****
30355 DEFINE PROCEDURE YES_NO
30360 MIN=1:MAX=1
30365 REPEAT FIND_LOOP
30370 DOT:PRINT "Y":AT ROW,COL
30375 A=CODE(INKEY$(1))
30380 IF A=78 OR A=89 OR A=27 OR A=10 THEN EXIT
FIND_LOOP
30385 END REPEAT FIND_LOOP
30390 IF A=27 THEN AT ROW,COL:PRINT "ESC":
INXCTL=3
30395 IF A = 78 THEN INXCTL=2:AT ROW,COL:PRINT
"N";
30400 IF A=89 OR A=10 THEN INXCTL=1
30405 END DEFINE YES_NO
30410 REMARK ***** ENTER PASSWORD *****
30415 DEFINE PROCEDURE PASSWORD
30420 INK_OLD_PAPER
30425 REPEAT LOOP
30430 ENTER_VALUE
30435 IF INXCTL=3 THEN EXIT LOOP
30440 SET=0:CHK_LENGTH
30445 IF NOT SET THEN EXIT LOOP
30450 END REPEAT LOOP
30455 INK_OLD_INK:PAPER 0
30460 END DEFINE PASSWORD
30465 REMARK ***** VERIFICATION *****
30470 DEFINE PROCEDURE VERIFY
30475 MAX=0:MIN=0
30480 REPEAT LOOP
30485 SET=0
30490 ENTER_VALUE
30495 CHK_LENGTH:IF NOT SET THEN EXIT LOOP
30500 END REPEAT LOOP
30505 END DEFINE VERIFY
30510 STOP
30515 DEFINE PROCEDURE DOT
30520 AT ROW,COL:CLS #1,4
30525 IF TYPE$="P" THEN INK_OLD_INK
30530 PRINT (FILL$(",",MAX))
30535 AT ROW,COL
30540 IF TYPE$="P" THEN INK_OLD_PAPER
30545 END DEFINE DOT
30550 DEFINE PROCEDURE ENTER_VALUE
30555 AT ROW,COL:CLS #1,4
30560 DOT:INPUT ENTRY$
30565 IF ENTRY$="" THEN RETURN
30570 IF ENTRY$(1 TO 3)=""END" AND LEN(ENTRY$)=3
THEN INXCTL=3
30575 END DEFINE ENTER
30580 DEFINE PROCEDURE CHK_LENGTH
30585 IF LEN(ENTRY$) > MAX THEN
30590 INPUT #0;"ENTRY TOO LONG - CR TO CONT
INUE";#0:CLS #0:SET=1
30595 END IF
30600 IF LEN(ENTRY$) < MIN THEN
30605 INPUT #0;"ENTRY TOO SHORT - CR TO CON
TINUE";#0:CLS #0:SET=1
30610 END IF
30615 END DEFINE CHK_LENGTH

```

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Lines 110 to 410 contain the data representing the machine code.

Listing B — the Assembler Listing

The assembly listing was not written to be a model of assembly programming, nor to be the most efficient method or even a structured method. It was written to investigate the use of Rom routines and as such it is worth examination. It undoubtedly will extend to a full blown monitor. If you attempt this you will discover that the *Concise Firmware Specification* has everything you need.

Program Notes

Lines 5-250 define the text for a simple menu and label some Rom routines for the program proper. Lines 260-880 place menu to screen using colours and pass to Line 1680 (Holdup).

Holdup awaits input and then passes control to the appropriate routine. You should be able to follow from there the routines for outputting the hex-dump and character dump. Note the highlighting of Ascii-characters in the dump, by use of colour changes. The Rom routines used (with their official names) are:

- #BBSA Txt Output — Outputs a character or control code to the text VDU.
- #BB18 Km Wait Key — Waits for next key from the keyboard.
- #BB1B Km Read Key — As #BB18 but doesn't wait.
- #BB90 Txt Set Pen — Set ink for writing colours.

- #B900 KI U Rom Enable — Turn on the Upper Rom.
- #B903 KI U Rom Disable — Turn off the Upper Rom.
- #B906 KI Rom Enable — Turn on the Lower Rom.
- #B909 KI L Rom Disable — Turn off the Lower Rom.
- #BB75 Txt Set Cursor — Set cursor position.
- #BB7E Txt Cur Disable — Disallow cursor display.
- #BBSD Txt Wr Char — Write a character to the screen — control codes are printed and not obeyed. Reset key manage, clear all buffers, restore standard key expansions and indirections.
- #BB03 Km Reset —

Using the Program

When initiated the program offers a Menu. First press *Caps Lock* and then press the letter corresponding to the memory you wish to examine.

L will be the hex and character dump of *Low Rom* from address 0 (it actually starts somewhat later) to #3FFF. It will stop at the end and return to Menu. *H* will similarly deal with the *High Rom* ending at #FFFF. *R* deals with all *Ram* up to #BFFF (the memory that follows is the default screen memory).

Enter will stop the display to allow closer inspection. Also whilst 'stopped' you have the option to rapidly advance the memory display in increments of 256-bytes by pressing *I*. When the indicator reaches the desired address press *C* to continue. Alternately *E* will return to Basic or *Q* will return

Menu. *Enter* will resume display and scroll.

Screen Display

From left to right the screen display consists of: Hex Address; eight hex values (the first corresponds to the Hex Addr. The remainder correspond to the previous address plus 1).

These are then followed by the character representation of the hex values. The next line increments the address by 8 and so on.

The hex dump is interesting, as it displays text embedded in the operating system. In Low Rom you will discover after the titles some strange names — Schneider for example. Even Arnold, the pet name for the machine, is mentioned. High Rom lists all the error codes. Well, have a look and see!

Potentially the Hex-dump can be very useful. Look for C9 (this is a return instruction) — the codes following this may well be the start of a useful sub-routine.

Within the bounds of a small article and one simple program, many points will go unmentioned — much will be oversimplified.

I hope to have given you a new slant to your machine without incurring too many 'tuts tuts' from those that know more, and those that know better!

```
e, 54, 49, 4e, 55, 45, 0, f5, c5, d5, e5, cd, 7e, bb
220 DATA 3e, c, cd, 5a, bb, 18, 1e, 5, 14, 7a, cd, 5a, bb, 23, 10, f9, 78, fe, 28,
28, f, 3e, d, cd, 5a, bb, 3e, a, cd, 5a, bb, 3e
230 DATA a, cd, 5a, bb, c9, 15, 2, cd, 7a, a6, 2f, ba, a2, 6, 25, cd, 21, a4, 15, 2
, cd, 7a, a6, 2f, de, a2, 5, 19, cd, 21, a4, 2f
240 DATA b, a9, cd, 1f, a4, 1e, 1, cd, 7a, a6, 2f, f7, a2, cd, 1f, a4, 2f, 1f, a9,
cd, 1f, a4, 2f, 33, a3, cd, 1f, a4, 2f, 47, a3, cd
250 DATA 1f, a4, 2f, 8f, a3, 6, 1e, cd, 2f, a4, 2f, 5b, a3, 6, 26, cd, 2f, a4, 15,
2, cd, 7a, a6, 2f, 9f, a3, 6, 28, cd, 2f, a4, 15
260 DATA 1, cd, 7a, a6, e1, d1, c1, f1, c3, 3d, a5, cd, 0, b9, e, 0, 1e, 5, 2f, 0, c
0, 3e, c, cd, 5a, bb, 79, fe, 0, 20, 17, 3e
270 DATA d, cd, 5a, bb, 3e, a, cd, 5a, bb, 16, 3, cd, 7a, a6, 3e, d, cd, 5a, bb, cd
, 17, a5, 3e, 20, cd, 5a, bb, cd, 1b, bb, fe, d
280 DATA 28, 63, 16, 2, cd, 7a, a6, 7e, cd, 20, a5, 15, 2, cd, 7a, a6, c, 23, 7b, f
e, 9, 28, 14, 7d, fe, ff, 20, 19, 7c, fe, ff, 28
290 DATA 3c, 7d, fe, ff, 20, f, 7c, fe, 3f, 28, 37, 7d, fe, ff, 20, 5, 7c, fe, bf,
28, 2d, 79, fe, 8, c2, b2, a4, e, 0, 18, 67, 7c
300 DATA cd, 20, a5, 7d, cd, 20, a5, c9, f5, f, f, f, cd, 29, a5, f1, e6, f, c6,
90, 27, ce, 40, 27, cd, 5a, bb, c9, 2f, 0, c0
310 DATA 18, 3, 2f, 0, 0, 3e, 7, cd, 5a, bb, cd, 18, bb, fe, 48, ca, a3, a4, fe, 45
, 28, 17, fe, d, 28, 89, fe, 4c, 28, 15, fe, 5f
320 DATA ca, 11, a4, fe, 52, 28, 54, fe, 49, 28, 75, 18, d9, 16, 1, cd, 7a, a6, c9
, e, 0, 1e, 3, 2f, 0, 0, cd, 5, b9, 3e, c, cd
330 DATA 5a, bb, c3, b2, a4, c9, 3e, 20, cd, 5a, bb, 3e, 20, cd, 5a, bb, 15, 1, cd
, 7a, a6, d5, 11, 8, 0, ed, 52, d1, e3, d5, c5, f5
340 DATA 7e, fe, 20, fa, a9, a5, fe, 7e, fa, a8, a5, 16, 3, cd, 7a, a6, cd, 5d, bb
, 15, 1, cd, 7a, a6, f1, c1, d1, e1, 23, c, 79, fe
350 DATA 8, 20, d9, e, 0, c3, b2, a4, c3, 11, a4, cd, 9, b9, cd, 0, b9, 3e, c, cd, 5
a, bb, 2f, 0, 0, e, 0, 1e, 9, c3, b2, a4
360 DATA 3e, c, cd, 5a, bb, d5, c5, f5, e5, 3e, 2, cd, 90, bb, 2f, c5, a3, 5, 15, c
d, 2f, a4, 2e, d, cd, 5a, bb, 3e, a, cd, 5a, bb
370 DATA 2f, db, a3, 6, 1e, cd, 2f, a4, 3e, d, cd, 5a, bb, 3e, a, cd, 5a, bb, 2f, f
9, a3, 6, 17, cd, 2f, a4, e1, f1, c1, d1, 2e, 0
380 DATA 24, cd, 63, a5, 7c, ba, 20, 3, 5f, e, 0, f5, e5, 2f, 1, 16, cd, 75, bb, 3e
, 1, cd, 90, bb, 3e, 26, cd, 5a, bb, 2f, 1, 17
390 DATA cd, 75, bb, e1, f1, cd, 17, a5, cd, 18, bb, fe, 43, 28, 6, fe, 49, 28, cd
, 18, 13, e, 0, f5, e5, d5, c5, cd, 3, bb, c1, d1
400 DATA e1, f1, 3e, c, cd, 5a, bb, c3, b2, a4, 7b, fe, 3, 20, 5, 16, 3f, e, 0, c9,
fe, 5, 20, 5, 16, ff, e, c0, c9, 16, bf, e
410 DATA 0, c9, f5, e5, 7a, cd, 90, bb, e1, f1, c9
```




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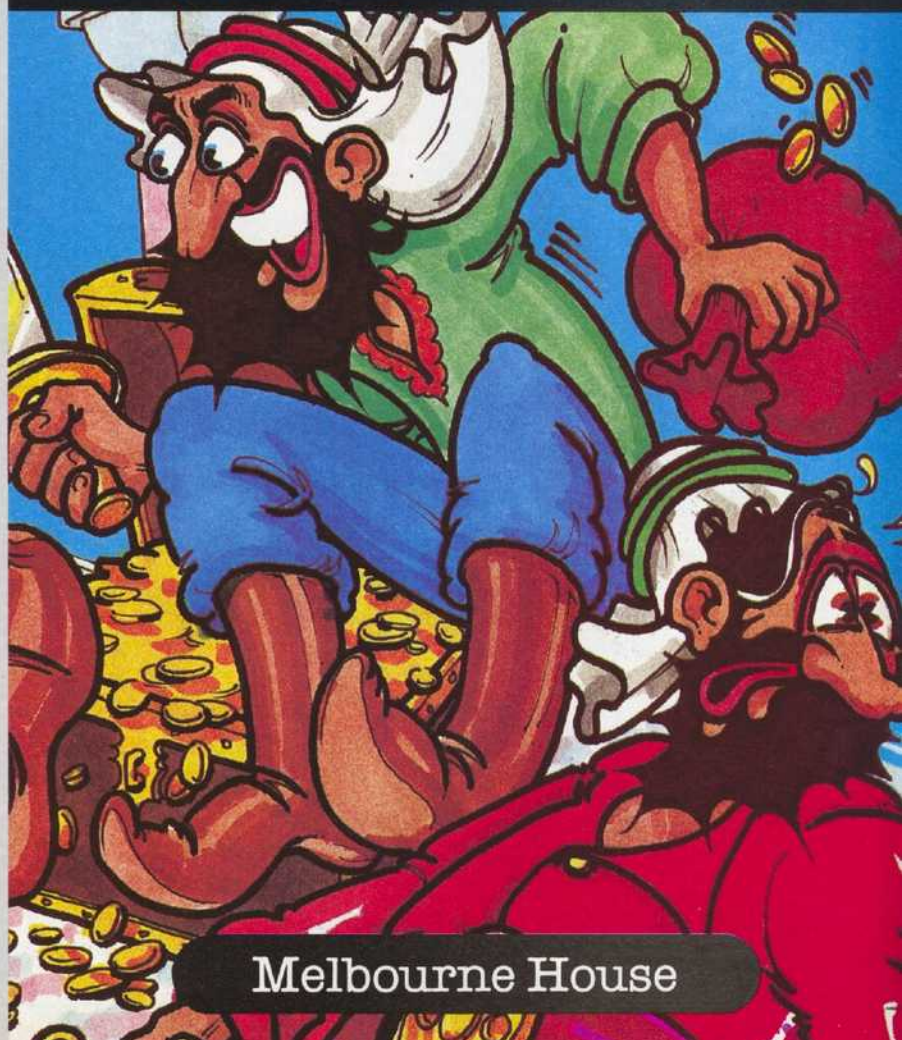
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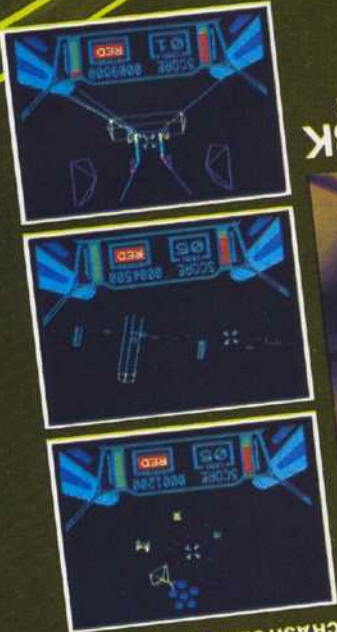
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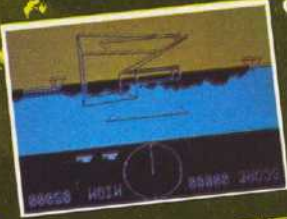
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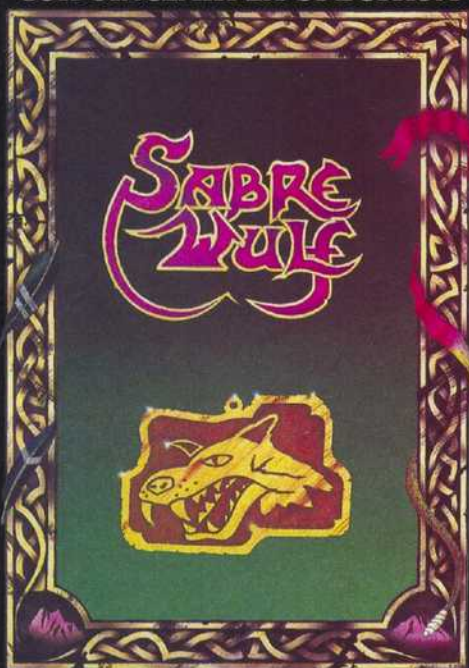
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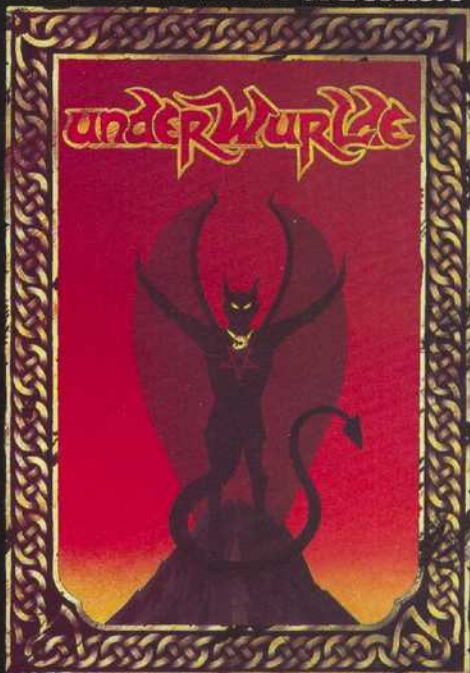


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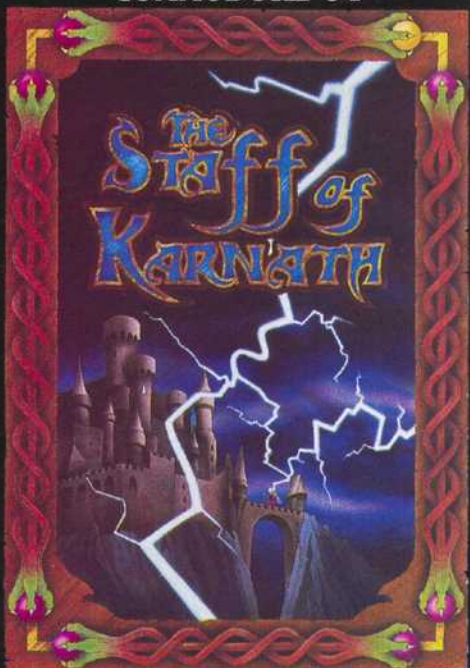
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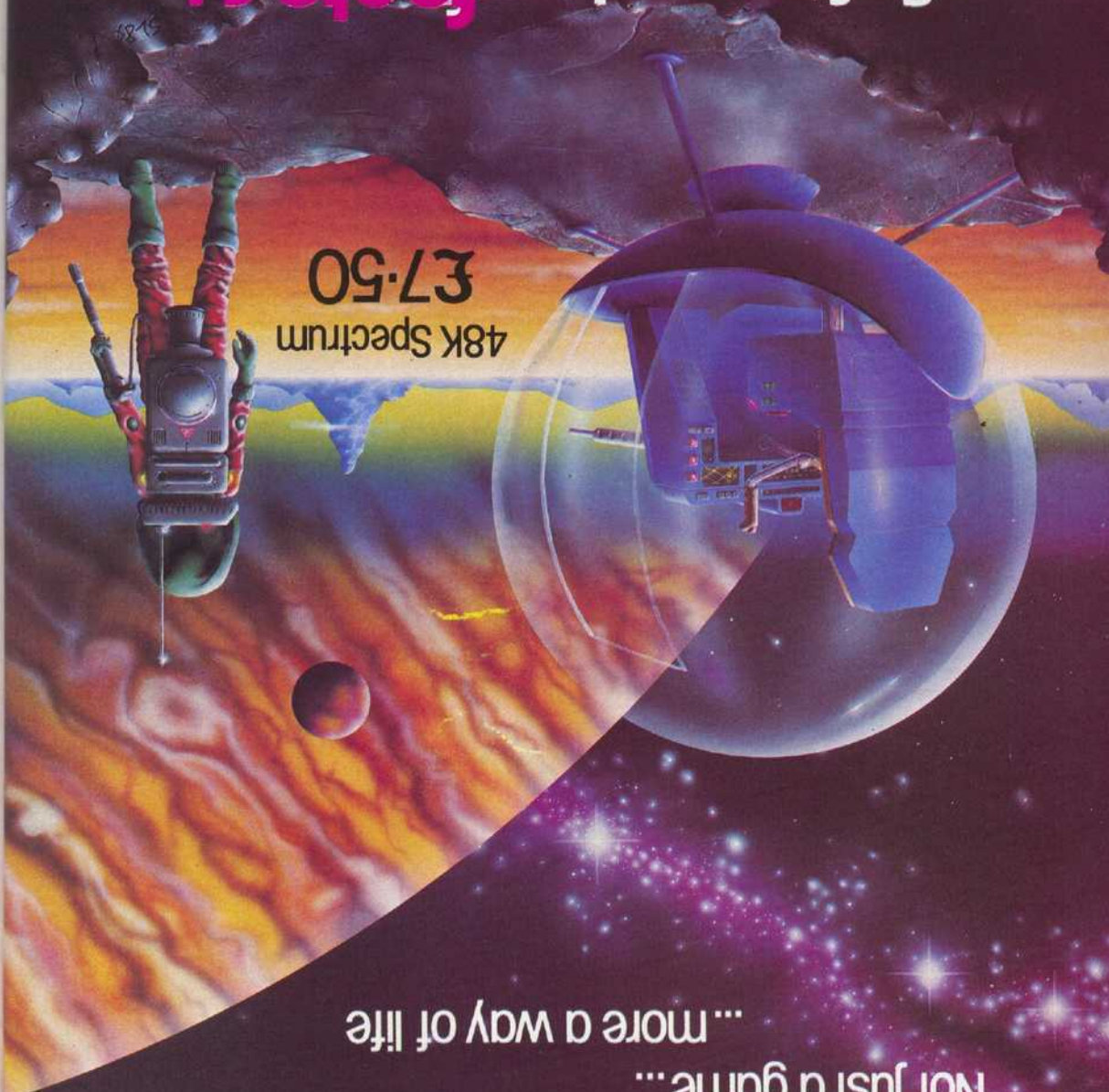
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A530	3E07	1600	HOLDUP	LD	A, #07	A5F0	0E1E	0570	LD	B, 30
A53F	CD5ABB	1600	CALL	OPUT		A5FD	CD21A4	0500	CALL	HEVCH
A542	CD18BB	1700	CALL	KYWAIT		A500	0E00	0500	LD	A, #00
A545	FE40	1710	CP	#10		A502	CD5ABB	0500	CALL	OPUT
A547	CAAB3A4	1720	JP	Z, BEGIN		A505	0E0A	0510	LD	A, #0A
A54A	FE45	1730	CP	#15		A507	CD5ABB	0520	CALL	OPUT
A54C	2B17	1740	JR	Z, NOMORE		A50A	21F9A3	0530	LD	HL, TEXT15
A54E	FE0D	1750	CP	#00		A50D	0E17	0540	LD	B, 22
A550	2B0B	1760	JR	Z, CONT		A50F	CD21A4	0550	CALL	HEVCH
A552	FE4C	1770	CP	#10		A512	E1	0560	POP	HL
A554	2B15	1780	JR	Z, LDORM		A513	F1	0570	POP	AF
A556	FE51	1790	CP	#51		A514	G1	0580	POP	BC
A558	CA11A4	1800	JP	Z, TOPS		A515	D1	0590	POP	DE
A55B	FE52	1810	CP	#52		A516	2E00	0700	LD	L, 0
A55D	2B04	1820	JR	Z, ALLRAM		A518	24	0710	INCR	H
A55F	FE49	1830	CP	*1*		A519	CD62A6	0720	CALL	ENSTOP
A561	2B75	1840	JR	Z, UPABIT		A51C	7C	0730	LD	A, H
A563	1BDB	1850	JR	HOLDUP		A51D	BA	0740	CP	D
A565	1601	1860	NOMORE	LD	D, #01	A51E	2003	0750	JR	NZ, OKAY
A567	CD7AA6	1870	CALL	COLOUR		A520	G1	0760	LD	H, C
A56A	C9	1880	RET			A521	0E00	0770	LD	C, #00
A56B	0E00	1890	LDORM	LD	C, #00	A523	F5	0780	PUSH	AF
A56D	1E03	1900	LD	E, #03		A524	E5	0790	PUSH	HL
A56F	210000	1910	LD	HL, #0000		A525	210116	0800	LD	HL, #1601
A572	CD06B9	1920	CALL	OHLD0R		A528	CD75BB	0810	CALL	SETCUR
A575	3E0C	1930	LD	A, #0C		A52B	3E01	0820	LD	A, #01
A577	CD5ABB	1940	CALL	OPUT		A52D	CD90BB	0830	CALL	SETPEN
A57A	C3B2A4	1950	JP	151T		A530	3E2E	0840	LD	A, #E*
A57D	C9	1960	RET			A532	CD5ABB	0850	CALL	OPUT
A57E	3E20	1970	CHARS	LD	A, #20	A535	210117	0860	LD	HL, #1701
A580	CD5ABB	1980	CALL	OPUT		A538	CD75BB	0870	CALL	SETCUR
A583	3E20	1990	LD	A, #20		A53B	E1	0880	POP	HL
A585	CD5ABB	2000	CALL	OPUT		A53C	F1	0890	POP	AF
A588	1601	2010	LD	D, #01		A53D	CD17A5	0900	CALL	FOURB
A58A	CD7AA6	2020	CALL	COLOUR		A540	CD18BB	0910	TESTIT	CALL KYWAIT
A58D	D5	2030	PUSH	DE		A543	FE43	0920	CP	*C*
A58E	110000	2040	LD	DE, #0000		A545	2B06	0930	JR	Z, SOFTY
A594	ED52	2050	SBC	HL, DE		A547	FE49	0940	CP	*I*
A593	D1	2060	POP	DE		A549	2B0C	0950	JR	Z, ANDT
A594	E5	2070	PUSH	HL		A54B	1BF3	0960	JR	TESTIT
A595	D5	2080	PUSH	DE		A54D	0E00	0970	SOFTY	LD C, #00
A596	C5	2090	PUSH	BC		A54F	F5	0980	START	PUSH AF
A597	F5	2100	PUSH	AF		A550	F5	0990	PUSH	HL
A598	7E	2110	LD	A, (HL)		A551	G5	1000	PUSH	DE
A599	FE20	2120	CP	#20		A552	C5	1010	PUSH	BC
A59B	FAA3A5	2130	JP	M, COLCH		A553	CD03BB	1020	CALL	#BB03
A59E	FE7E	2140	CP	#7E		A556	C1	1030	POP	BC
A5A0	FAA8A5	2150	JP	M, TEXCH		A557	D1	1040	POP	DE
A5A3	1603	2160	LD	D, #03		A558	E1	1050	POP	HL
A5A5	CD7AA6	2170	CALL	COLOUR		A559	F1	1060	POP	AF
A5A8	CD50BB	2180	CALL	#BBS0		A55A	3E0C	1070	LD	A, #0C
A5AB	1601	2190	LD	D, #01		A55C	CD5ABB	1080	CALL	OPUT
A5AD	CD7AA6	2200	CALL	COLOUR		A55F	C3B2A4	1090	JP	151T
A5B0	F1	2210	POP	AF		A562	7B	1100	ENSTOP	LD A, E
A5B1	C1	2220	POP	BC		A563	FE03	1110	CP	#03
A5B2	D1	2230	POP	DE		A565	2005	1120	JR	NZ, ENSS
A5B3	E1	2240	POP	HL		A567	1E3F	1130	LD	D, #3F
A5B4	23	2250	INCR	HL		A569	0E00	1140	LD	C, #00
A5B5	0C	2260	INCR	C		A56B	C9	1150	RET	
A5B6	79	2270	LD	A, C		A56C	FE06	1160	ENSS	CP #06
A5B7	FE0B	2280	CP	#B		A56E	20A5	1170	JR	NZ, ENSS
A5B9	2009	2290	JR	NZ, INCH		A570	1E1F	1180	LD	D, #1F
A5BB	0E00	2300	LD	C, #00		A572	0E00	1190	LD	C, #00
A5B0	C3B2A4	2310	JP	151T		A574	C9	1200	RET	
A5C0	C311A4	2320	FINIT	JP	TOPS	A575	1E1F	1210	ENSS	LD D, #1F
A5C3	CD09BB	2330	ALLRAM	CALL	OFLOPD	A577	0E00	1220	CALL	C, #00
A5C6	CD00B9	2340	CALL	ONUPRD		A579	C9	1230	RET	
A5C9	3E0C	2350	LD	A, #0C		A57A	F5	1240	COLOUR	PUSH AF
A5CB	CD5ABB	2360	CALL	OPUT		A57B	F5	1250	PUSH	HL
A5CE	210000	2370	LD	HL, #0000		A57C	7A	1260	LD	A, D
A5D1	0E00	2380	LD	C, #00		A57D	CD90BB	1270	CALL	SETPEN
A5D3	1E09	2390	LD	E, 9		A580	E1	1280	POP	HL
A5D5	C3B2A4	2400	JP	151T		A581	F1	1290	POP	AF
A5D8	3E0C	2410	UPABIT	LD	A, #0C	A582	C9	1300	RET	
A5DA	CD5ABB	2420	CALL	OPUT		ALLRAM	A5C3	ANDT	A618	ADMT
A5DD	D5	2430	PUSH	DE		BEGIN	A1A3	BITS	A529	CHARS
A5DE	C5	2440	PUSH	BC		COLOUR	A57A	COIT	A10A	ENSS
A5DF	F5	2450	PUSH	AF		ENSTOP	A5E3	FINIT	A500	FOURB
A5E0	E5	2460	PUSH	HL		HERE	A197	HOLDI	A535	HOLDI
A5E1	3E03	2470	LD	A, #03		INCH	A594	151T	A182	ISRAM
A5E2	CD09BB	2480	CALL	SETPEN		KYWAIT	B21B	LDORM	A5E8	MISS
A5E6	2106A3	2490	LD	HL, TEXT13		NOMORE	A5E5	NOM	A12B	OFLOPD
A5E9	0E1E	2500	LD	B, 22		OKAY	A523	OHLD0R	B906	OHLD0R
A5EB	CD21A4	2510	CALL	HEVCH		SETCUR	B77E	SETPEN	B906	SOFTY
A5EE	3E00	2520	LD	A, #00		START	A6A4	TESTIT	A6A0	TEXCH
A5F0	CD5ABB	2530	CALL	OPUT		TEXT14	A39F	TEXT12	A381	TEXT13
A5F3	3E0A	2540	LD	A, #0A		TEXT15	A3F9	TEXT3	A2DE	TEXT4
A5F5	CD5ABB	2550	CALL	OPUT		TEXT16	A31F	TEXT7	A333	TEXT8
A5F8	21DBA3	2560	LD	HL, TEXT14		TOPS	A411	UPABIT	A5D8	TEXT9
										A41F
										A5A3
										A675
										A1CE
										A5D9
										A421
										B903
										B65A
										A640
										A28A
										A30B
										A3BB

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Avenue, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Tony Kendle

of in future Avenues, Paul we will be hearing a lot more level. I'm sure that it is a game wish it even at the very easiest movement and have yet to fi- still astounded at the speed of turn. After weeks of play I am the best of its kind for the Spec- Design-Design. It is surely the plug for *Dark Star* from Paul also wants to put in a address).

Andrew then goes on to give some tips for *Pyanamara* (see PCW 27th Sept for the fact and some weeks ago is in fact of his *Jet-Set Editor* I mentioned some weeks ago is in fact written to tell me that the price Paul Rhodes of Luton has

time. Games to keep any favourite Spectrum game of all *Wally*. I think this must be my completed test 5 of Incentive 25th October I successfully

Ford. At 3am on Thursday from Guy Hedley of Chandlers completely unfamiliar with about a game that I am Now then, here's a letter me it still won't be easy. Andrew, but something tells the moon and bring it back. Many, many thanks for that gnet to get the alarm key on must be on). Then get the ma-

get the key (the HELP feature scissors to cut the balloon and the book you can get the Then get the library ticket to banister to get the helmet. the driving licence to get the ignition keys to slide down the next paragraph NOW! Get want to know how to do go to — so those of you who don't give some tips for *Pyanamara*

Andrew then goes on to Melbourne House. and *Terror Dakiti 4D* from *gate, Centipede* by C-Tech from are Quicksilver's *Time* favourite Spectrum game of all

1233 points, but does not give these tips. In order to kill the zombies you must first use your helicopter to build up one of the walls. Make the wall 3 blocks high and as long as you possibly can as this gives you more points. Don't forget to put steps at one end to climb up. Then find the zombies and pick one out that is not too close to the others. Then if you are in the copier you can land directly behind him and touch him on the back so he turns magenta and you can control him. You then lead the zombie on foot to your wall and he will follow you along to the musical accompaniment of *Ten Green Bottles*. You can then walk off the end and the zombie will fall to its death."

Andrew Dudman of Clossop writes: "I have finished *Milkyrama*. When you insert the alarm key the clock rings for a display and then the message 'Congratulations. Wally's work up. For the first time in his

congratulations go out 'firsts'. From 5 Ryan of *Am Attack*. I finished at 1.45 pm on Saturday 6th October after killing 14 zombies. The message appears 'You've been ten as this time human, but we'll get you...next time accompanied by a burst of sound."

Hayes comes the claim to be the first to finish *Zombie Zombibie*. Quicksilver's follow-up to *Am Attack*. I finished at 1.45 pm on Saturday 6th October after killing 14 zombies. The message appears 'You've been ten as this time human, but we'll get you...next time accompanied by a burst of sound."

who has also finished, with from W E Cowling of Redruth same postbag arrived a letter actually the first because in the 'It's difficult to say who was

what sounds like two channels. *March of the Toreadors* in written: "I have finished *Milkyrama*. When you insert the alarm key the clock rings for a display and then the message 'Congratulations. Wally's work up. For the first time in his



Pyanamara

Arcade Avenue

Screen Fill

by M Poole

```

1 REM **SCREEN FILL**
5 POKES6,28:CLR
20 FORS=71687024+1:READN:FORES,N:NEXT S
100 DATA169,0,133,87,169,30,133,88,165,87,133,89,165,88,105,120,133,90,
169,0,133
110 DATA91,169,0,133,92,162,23,160,22,136,165,91,145,87,165,92,145,
89,136
120 DATA208,245,145,89,165,91,145,87,24,165,87,105,22,133,87,144,2,
230,88
130 DATA24,165,89,105,22,133,89,144,2,230,90,202,208,211,96
1000 REM 716987173 - TWO BYTE LOCATION OF TOP LEFT CORNER OF SCREEN
TD FILL
1010 REM 7187 - CHARACTER 7191 - COLOUR 7195 - NO.ROWS 7197 -
NO.COLUMNS

```

This short machine code routine will work on Vic 20

Screen Fill

on the unexpanded Vic 20. It allows the user to fill in any window on the screen in any character and in any colour.

The locations which hold the values of the window, character and colour are shown in routine is called by *Sys 7168*.

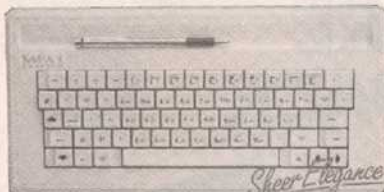
The routine can also be used as a partial screen clear by using Character 32. The whole screen with character φ in black. the listing which, at present, is set up to fill

We are always actively seeking programs for publication — either for Open Forum, the machine pages or Star Games. When sending in a program for consideration, a clear program listing should be sent, together with, wherever possible, a saved copy on cassette. Documentation — usually not more than 1000 words — should start with a general description of the program, what it does, and then some detail of how the program itself is constructed. We pay very competitive rates, according to the length and nature of the program and the quality of the accompanying documentation.

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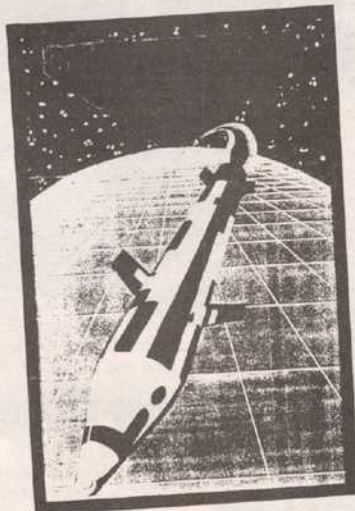
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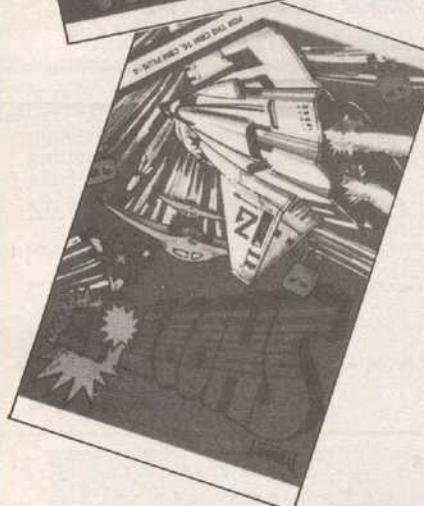
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FAST LOAD
1 1/2 minutes

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SYNTAX ERROR!

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Line Feed

on Amstrad

As the User Manual informs you, the Amstrad Basic issues a line feed *Chr\$(10)* and a carriage return *Chr\$(13)* to a printer. If your printer, as mine does, also line feeds then *List* produces a double spacing. My

solution is to use a short sub-routine to detect *Chr\$(10)* and to change it. The *Jumpblock* for printing a character is *\$BD2B* which is in Ram and so can be amended. My program *Pokes* a jump to *Width 255* then *List*, #8. You should get a normal listing.

For future use save this program, then load the program you wish to list.

Width 255 then *List*, #8.

ADD A,A — Doubles A to 20

RST 08 — Default codes at *\$BD2D*

= *CFE28C*

To test, enter the listing then run it. Set *Width 255* then *List*, #8. You should get a normal listing.

Load the program you wish to list.

Width 255 then *List*, #8.

The Music Box

Line Feed
by J Povey

```

10 CLS:MEMORY 42299
20 FOR a=48427 TO 48429
30 READ b:POKE a,b
40 NEXT a
50 FOR a=43000 TO 43008
60 READ b:POKE a,b
70 NEXT a
80 DATA 195,248,167,254,10,32,1,135,207,242,135,201

```



Half-way good

I've just spent a couple of hours playing with Super-Soft's *Music Master* program, written for the Commodore 64 by Nick Higham.

Like all the music programs around at the moment, *Music Master* is a half-way good program — which is only to say that it has weaknesses and strengths. Despite the program's regrettable name, its strengths make *Music Master* the equal — if not the superior — of any program designed to turn the 64 into a real-time pre-set backing-track facility (even through an unmodified keyboard. In particular, the *Music Master* is versatile and sounds good (TV set). Where *Music Master* falls down is on its sequencing cord tracks.

When will somebody produce an adequate self-contained sequencer allowing over-dubbing and mixing of the 64's three sound channels from the computer keyboard in real-time? Even the much-vaunted *MusicCalc* from the American company Waveform is lacking in this respect.

The important thing, as far as sequencing is concerned, is to be able to hear one track while you are recording another — in other words, to be able to accompany yourself. While *MusicCalc* allows you to alter and edit tracks at will, it only allows you to do this with great difficulty, and the ability to accompany yourself in a sample and obvious way seems to be entirely absent.

If I've missed something in either of these programs (which, incidentally, share this name) please let me know. I suspect I haven't, partly because my own experience suggests that the timing of a three-channel sequencer is quite tricky, since you have to read and write to the computers sound chip at more or less the same moment.

Step-time sequencing is notational variety, but they haven't written notes in one form or another matter. This involves writing notes in one form or another and using the screen as a sort of score. Notes are entered in sequence but one step at a time, often by typing in their name (C-major, for example). Here *Music Master* has the edge on *MusicCalc*, even though it is still not perfect, by any means. The problem is with notation — *Music Master* uses parallel lines on which note names appear as designed for good looks rather than clarity, is the third.

Nevertheless, a composing tool to be reckoned with — I can hardly wait for the 64 version.

Gary Herman

The *Music Box* is a new weekly column with news, reviews and readers comments on all aspects of micro and music. Any readers with experience of computer music making or comparisons with new products are invited to write to: drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street, London WC2R 2LD.

The model of step-time sequencing has to be Island Logic's *The Music System* for the BBC Model B (a Commodore next year).

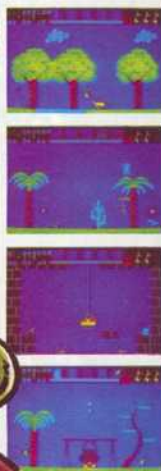
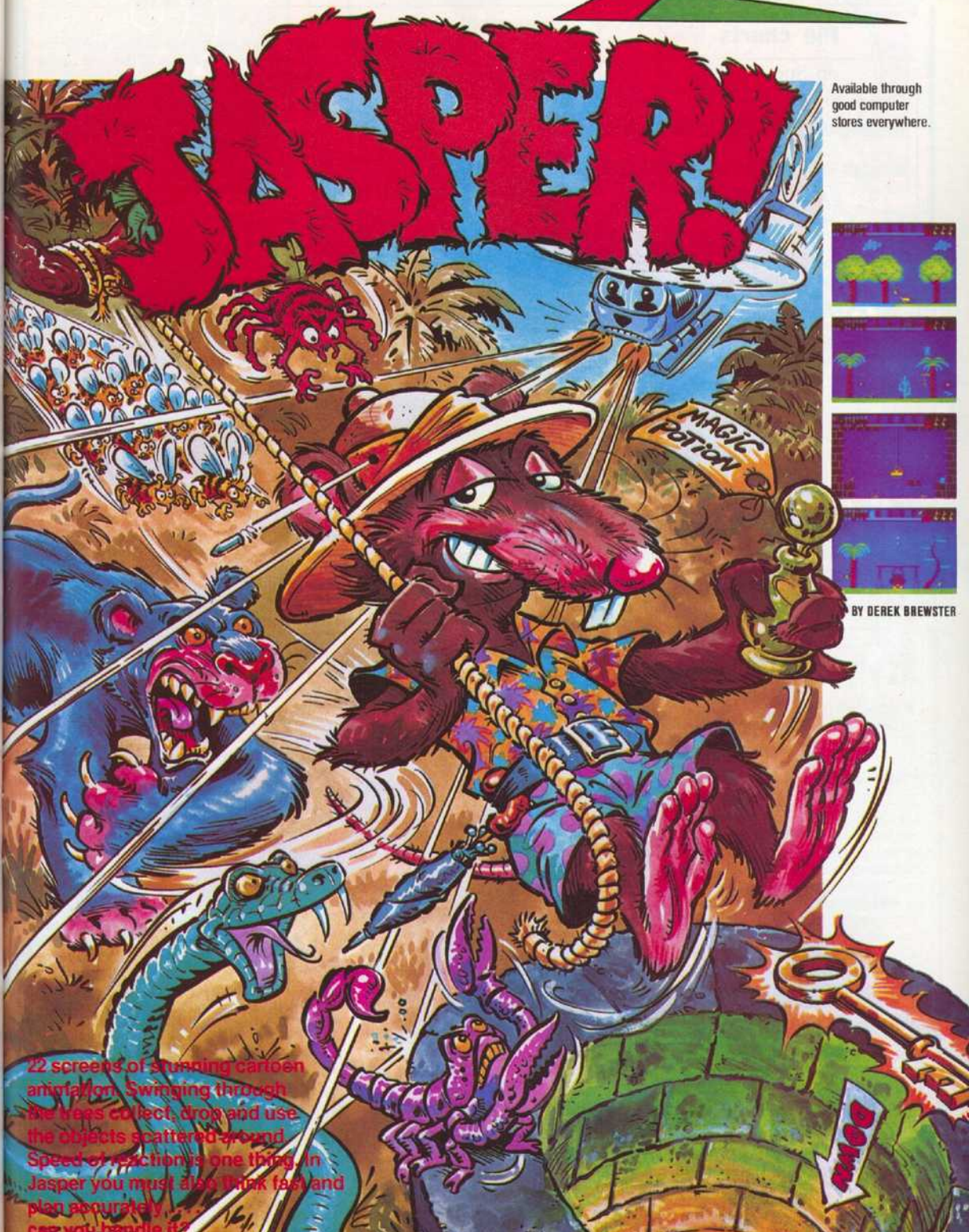
This is the nearest thing to a real composing program, although it is still not perfect, by any means. The problem is with notation — *Music Master* uses parallel lines on which note names appear as designed for good looks rather than clarity, is the third.

Nevertheless, a composing tool to be reckoned with — I can hardly wait for the 64 version.

The *Music Box* is a new weekly column with news, reviews and readers comments on all aspects of micro and music. Any readers with experience of computer music making or comparisons with new products are invited to write to: drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street, London WC2R 2LD.

AT LAST THE ARCADE ADVENTURE FROM MICROMEGA

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BY DEREK BREWSTER

22 screens of stunning cartoon animation. Swinging through the trees collect, drop and use the objects scattered around. Speed of reaction is one thing, in Jasper you must also think fast and plan accurately... can you handle it?

It is a matter of fact that professions in any field will invent special terms and a short-hand language of their own, for use in their work. To an outsider, the use of such jargon and slang words can be very confusing, and the world of computing is no exception. To the average person, Ram is nothing more than sheep, and such words as glitch, kindge, Lilo, Logo, and Cigo sound therefore written a very concise, easy to follow and well-paced guide to the jargon of computer technology.

A book that gets totally against the grain in terms of all that I hold dear, being totally boring and uninteresting in terms of basic concept. On the other hand *Dynamic Games for the Amstrad* doesn't have that much competition as yet, so it's undoubted that it's of some interest to Amstrad owners.

The book is a collection of times, common to all kinds of Many basic machine code routines, than pure academic education. It's important for reasons other than pure academic education. Don't reinvent the wheel. That's the tact advice of this book which details the functioning of the Spectrum Operating System. Understanding the system is important for reasons other than pure academic education.

Detailed and useful information backed up with numerous appendices and comprehensive (and vital) index — a good buy for initiates.

The book does not merely explain what each routine does and where they are located in memory, but contains detailed information about what elements of the routine may, and may not, be played around with. For example, in some routines apparently innocent mutations will play havoc with the stack pointers causing... well, best not to talk about it.



Book The Spectrum Operating System
 Price £5.95 Micro
 Publisher Spectrum Software
 Castle House, 27 London Road, Tunbridge Wells, Kent



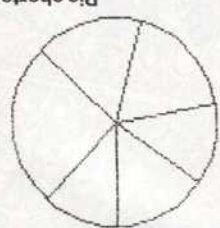
Book Dynamic Games for the Amstrad
 Price £5.95 Micro
 Publisher Amstrad Publications, 9-11 Kensington High Street, London W8 5NP



Book Puffin Dictionary of Computer Words
 Price £1.95
 Publisher Puffin Books

Book Ends

Pie charts
 by D'Heron



3100 USER 12%
 27. C. M. 25%
 17. C. N. 17%
 9100 PROG 10%
 10/40 TAPE 15%
 10/40 TAPE 15%

```

350 LET A=ADD/100*PI300 LET X=5
0*5IN A: LET Y=50*005 B
370 CIRCLE 200,50,50
390 PLOT 200,50: DRAW X,Y
400 BEEP .05,0
410 LET I=(A/R)/(360)*100
420 PRINT R:K,L:BS(R,1 TO )
...I:XX*430 LET K=K+1:440 NEXT R
435 BEEP .1,30
440 PRINT AT 21,2:"COPY"
450 IF INKEY$="" THEN GO TO 450
470 IF INKEY$="V" THEN PRINT AT
21,2:"COPY: GO TO 450
450 PAUSE 100: GO TO 450
MARKET SHOPS 1980/84

```

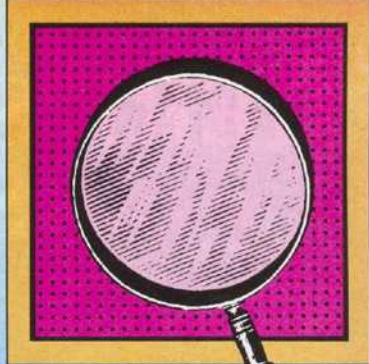
This will convert percentage inputs into degrees. It is reasonably user friendly and will not, for example, accept more than 100% as an input. Your various entries are labelled and displayed at the end of the operation.

```

100 REM © DEREK HERON 1984
110 CLS: PRINT INK 2:AT 10,0:"PIE CHART"
120 PRINT INK 1:AT 12,0:"DEREK HERON 1984"
130 PAUSE 0.5:CLS:300 POK 20550,0
140 INPUT "CHART TITLE":T$
150 INPUT "NUMBER OF ENTRIES":N
160 BEEP .05,30:LET SUM=0:FOR T=1 TO N
170 BEEP .05,10:PRINT AT 2,2:"NUMBER OF ENTRIES":N
180 PRINT AT 4,2:"ENTRY NUMBER":T
200 BEEP .05,10
210 INPUT "PERCENTAGE TITLE":P$(T)
215 BEEP .05,40:220 INPUT "PERCENT":P%
230 BEEP .05,10:240 LET SUM=SUM+P%:IF
SUM>100 THEN LET SUM=SUM-P:GO TO
250 BEEP .05,10:260 LET P=(P/100)*360
270 PRINT AT 1,2:"P=250 IF SUM=100 THEN
PRINT AT 5,2:"TOTAL PERCENTAGE":
SUM: BEEP .1,30:GO TO 300:320 NEXT
T:330 CLS:340 PRINT INK 2:AT 1,132-
LEN T$)/2:INVERSE 1:7:310 LET R=0:
0:LET K=4:LET L=2:320 FOR R=1 TO N
330 LET T=R(R):340 LET R=ADD+T

```

Pie charts



'Another winner in The Hobbit class. It's a complex real time adventure which will keep devotees puzzled for hours.' *DAILY EXPRESS*

'Sophisticated, rich in atmosphere and amazingly detailed, Sherlock is a game which no Spectrum owner will want to be without.' *MICRO ADVENTURER*

'Sherlock is a long way ahead of the rest of the competition.' *PERSONAL COMPUTER NEWS*

'In Sherlock you can not only talk to other characters, of whom there are at least thirteen, and ask them to do things for you, but you can also interrogate them and even discuss the case.' *SINCLAIR USER*

'Sherlock Holmes has been well worth waiting for with an 800 word vocabulary, real Victorian transport system - cabs and trains and all, and a cast of characters, peopling screens of graphics designed by Mugsy man Russell Comte.'

YOUR COMPUTER

'An intriguing and absorbing game.'

COMPUTER AND VIDEO GAMES

'I have been totally enthralled with this new brilliant adventure. I thought The Hobbit was good, but the added vocabulary and the even more intelligent characters, makes Sherlock number one in my software collection.'

MR ROGERS, BATH

'Sherlock must be the most complex adventure ever created.'

The creation of atmosphere is superb (more like that of a novel, than a computer game) in fact playing the adventure feels more like acting than playing a computer adventure.

The characters in Sherlock behave just as they would in real life and have a very human feel to them, not only in the way they react to situations, but also in their displaying of human emotions.'

MR STERN, HERTS

'Rich mental imagery.'

CRASH

'Sherlock is an adventure which has yet to be beaten.'

YOUR SPECTRUM

'Sherlock is a superb program and will provide many hours (hours? months more likely) of stimulating entertainment.'

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PC GAMES

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NORMAN SCOTTER.

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CHARLES COOPER.

(Sorry, Charles)

"I hate this game. I seem to be missing all my favourite TV shows" ADAM BOWLES. (Poor old Adam)

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Mark Kinsman of Worthing, Sussex, writes:

Do you know of any company that will buy an out of guarantee 48K Spectrum (issue 3). I do not wish to sell it privately as I need to sell it quickly.

A These are a number of companies that will buy "used computers", however, I am not in a position to recommend any of them, not having dealt with them myself, or having heard of anyone else who has dealt with them.

Personally I would try and sell your machine yourself, either via an advert in your local paper, or in PCW Classifieds (which is actually very cheap). You should realise that your machine if you sell privately will get more money for man.

Top of the league
Andrew Bolsover of Sheffield, writes:
I own a Spectrum and am trying to create, save and load files to and from tape. Please could you tell me how to go about this? The files I want to create are the number of matches currently played by my favourite football team's players. It's the save, in order to be able to add to it accordingly. I hope you follow my drift.
A How about this, Andrew? 10 DIM \$(:):REM array for matches played — 20 players

REM set up array of
"

matches played
100 SAVE "matches" DATA \$(:):REM stores matches played array
110 REM on cassette.
REM prepare for updating
210 REM into the array \$, ready for updating

This process of Save and Load Data, can be used for any type of data (string or numeric) and for any length of array. The only point to remember is that you must have executed a Dim statement prior to Loading the array, and that the Dim statement must be the same as when you saved the array.

Positional control
Paul Haigh of London, writes:
I am looking for methods of positional control using a small micro. The Spectrum, and I was hoping to use this to control a number of stepping motors. I would be grateful if you could tell me who to contact as regards an interface or whether there is a book on this subject that may help me. There is a book that I should help you with this project. It is called the *Sinclair Database* and was written by Beadmore et al.
One more thing I think you would also be well advised to look at is the *Spectrum Hardware Manual* published by Melbourn House as it contains a lot of information which will be useful to you.

Stamped issue 3
Paul Shipley of London, writes:
I intend buying a second-hand Spectrum. As the issue 3 is the latest version, is this the one I will choose, or is there a big issue 3 stamped on the case, and if not, how can I tell the difference between the three issues?
A Also, is there a short program or routine I could use which will test the machine and draw attention to any faults?
A Unfortunately the issue 3 does not have anything

Design Problem
Dominic McCann of Liverpool, writes:
I have now had my Spectrum for three months, and all this time I have wanted to write my own game. I can do the basic loader with no problems. It is just the picture that bothers me. This regards an interface or picture that bothers me. This subject that may help me. There is a book that I should help you with this project. It is called the *Sinclair Database* and was written by Beadmore et al.
One more thing I think you would also be well advised to look at is the *Spectrum Hardware Manual* published by Melbourn House as it contains a lot of information which will be useful to you.

special stamped on the case. In fact, the only method of telling which version a particular machine is, is the now legendary *Print In 1602* statement. I do not intend to prolong that debate any more... enough cannot inches have already been devoted to it.
The main problems that you are likely to get with an ageing Spectrum are Saving and Loading and keys not functioning. So test every key in every mode, and try saving and reloading a program, plus loading and keys not functioning. That will pick up any major faults... unless of course you out there know different!

Unofficial command
J J Smith of Port Glasgow, writes:
I have a ZX Spectrum 48K and know machine code. Only recently, I discovered that there are assembly language mameonics which exist that are not in the Spectrum manual. Is there any book which lists these "unofficial" instructions? As you quite rightly point out, there are a number of Z80 instructions that are not documented in the Spectrum manual. This is simply because they are not of particular interest to Spectrum machine code programmers. Having said that however, the book that you want (if you are still interested in pursuing your quest) is *Z80 Assembly Language Programming*, written by Lance Leventhal.

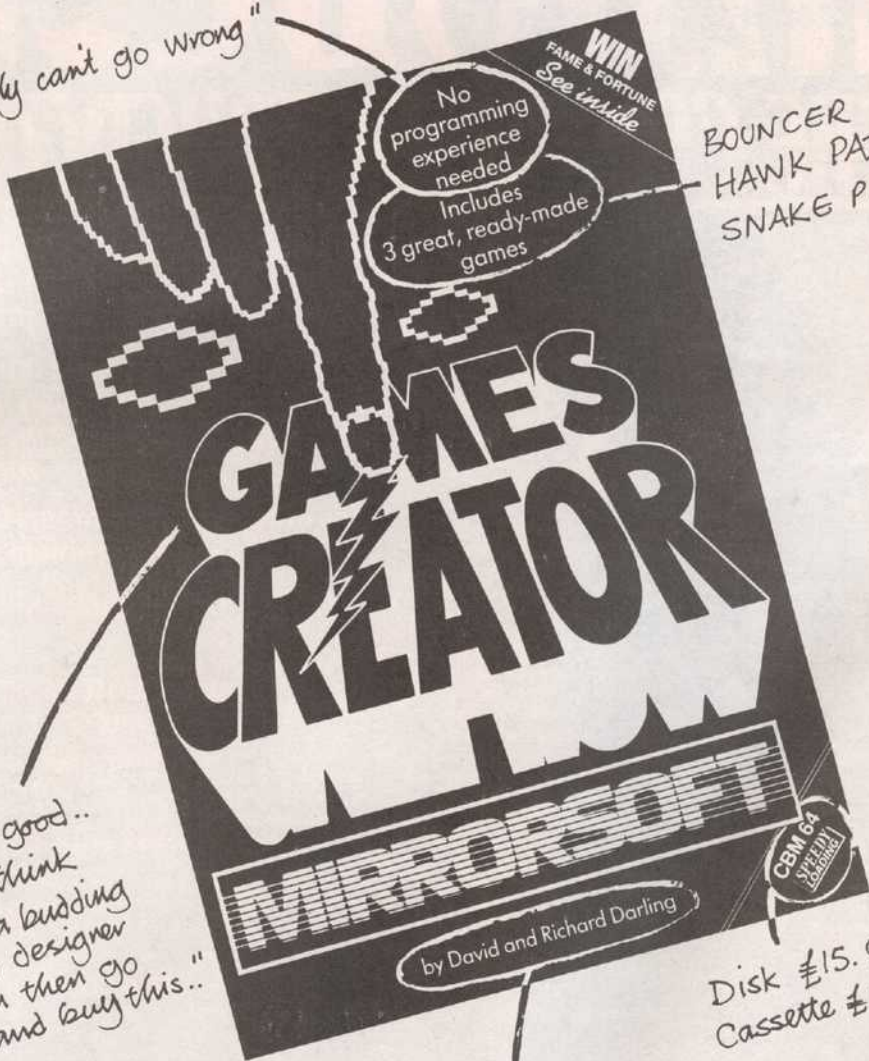
Data transfer
E A Duncan-Dunlop of Bridgend, Mid Glamorgan, writes:
How can I network between a QL and an issue 3 Spectrum? What do I type in to the QL? What do I type in to the Spectrum? Are the baud rates the same? (My QL is the PM version.)
A PCW Vol 3, no 34 contains an article, by B Corbett, on sending QL strings to a ZX printer attached to a Spectrum. The baud rate used (on both machines) was 600, although the writer did say that this was for no particular reason. While the article did refer to using the Spectrum printer, the principles of data transfer remain the same. Instead of using *Lprint* on the Spectrum, the data passed across could have easily been put onto micro-driver, or stored in the Spectrum memory.

is there anything about your computer you don't understand, and which everyone else seems to take for granted? What ever your problem Peak it to Phil Rogers and every week he will Poke back as many answers as he can. The address is Peak & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD

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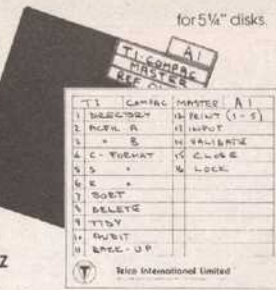
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Tony Bridge's Adventure Corner



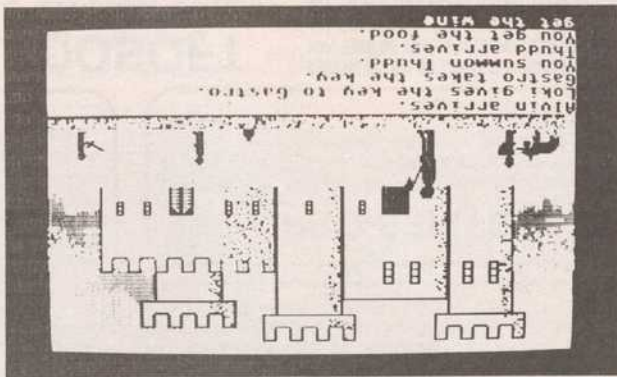
Drapnir meets Mabeth

who must be present?"

Actually, the question is often even more basic than this — like the one from Michael Kay: "I haven't found any of the Quest items. Please give me a clue!" And this one from P G Hill: "I have collected all useful objects and visited all the locations I can...I've done everything but still can't find any of the Quest objects. I'm sure that if I can find Orit and Orit will unfold." The later objects seem to cause no trouble, but Orit and Drapnir seem to present no end of hassles. I hope that I can help you get somewhere, Michael. To get Orit, go to Krank's Hall where you will almost certainly meet Krank. If you do then you have to remove him, and this will enable you to scoot off to the north west. There you will find a chest containing the object of your first quest. You have to be quick, however, or else that little thief Klepio will have your treasure away before you can lay your hands on it.

I don't often mention Valhalla, and you probably know by now that it is not one of my favorites. This is not to say, of course, that it is in any way an inferior program — it has sold many thousands of copies, becoming one of the major success stories of 1984 and must rate as one of the classics. With Legend's next release, The Great Space Race, due out soon, it is now about time that I updated the Valhalla Chronicles.

The success in Britain of Legend's program has been repeated across the world, it seems (although, strangely, the program has not met with similar applause in the States). Valhalla is obviously doing pretty well in Israel, as several people have testified. Jacob Mindor has a problem that seems to be one that vexes most people. Felstung is much easier to find than many of the other objects, even if your copy does not possess the Felstrong Bug, ie, a



"It is generally not a good idea to drop things in Ranker's Hall.

friendly God. In this way, if you need a get rid of such an object, then give it to a God, and ask him nicely to return you goods. Of course, he may refuse."

"Another reason for remaining friendly with the Gods (especially strong ones like both and Thor) is that all the quest objects are in chests or cupboards that are too heavy for you to open, so that you will need to enlist help.

"In general, it is better to carry a sword than an axe, although when you finally get round to searching for Ginnir, you will have to keep switching between Skallr and Felstung. Likewise, a helmet is not much use. I haven't found a location where you must carry a helmet to enter, though there are several where you must not be carrying one.

"An important point to remember, when searching for the later quest objects, is that to enter certain locations you have to satisfy two conditions instead of the usual one. For instance, if you are carrying Skorrn, but not Drapnir, you can travel north from Klepio's Hall. This should get you into Skallr, but I think you will find that your Troubles are just beginning..."

"Finally, a good map is essential."

Thanks for those tips, Iain — you mentioned in a couple of weeks time, when I do an update on the program.

Iain's letters arrived over the course of several weeks, during which time he eventually managed to finish the adventure — the same is true of John Rundle, from Aldershot (see last week's PCW letters page for John's interesting chess problem). John will very kindly supply Fact Sheets for Valhalla, Colossal Cave, Pirate Adventure and the Hobbit. Write to him at 26 Western Road, Aldershot, Hants, (and don't forget the SSAR!).

To find Drapnir, you need to go to the location north from Despair. The way to get there, though is not so simple. First go to the Pits of Hell, and give Orit to someone. This one comes from John Ashcroft, who carries on: "I always use Short, as he will pay you for Orit. He'll drop it later for you — and he hardly ever gets killed! Then go east, jump to Help, sunnnon Help, Then go north, and north again, where you will find a chest."

I hope these tips will get some of you on the way to fulfilling the Quests.

Before I discuss Mabeth, which has just been released, I must declare my interest in the program. The team of seven who created the adventure were given their brief by Dunstons Publications, who are the publishers of this magazine. So you can imagine that I feel rather like a distant cousin to someone who has made a Number One record. I wasn't involved in the development of the program but, even so, I've been watching its progress since its release

Tony Bridge's Adventure Corner

by Creative Sparks with great interest. It has been called, by one reviewer in a rival magazine, "probably the best adventure of 1984".

The price of £14.95 may seem rather a lot at first glance, but for this you get a nice chunky box, containing two cassettes, and a fat little book. This is the complete text of the play, edited from the original 1623 version by two members of the Oxford-based development team. Besides the play, the book also contains commentary on the characters and the play itself — on its own, the book is valuable; with the program, it's sensational! In fact, there are eight programs in all. Four are graphic and text adventures. These follow the usual adventure conventions — but the graphics are beautifully drawn (by another member of the team), and are "dynamic", that is, the picture will change as the player opens doors, takes objects and so on. The four adventures are different in approach, so that the player takes Macbeth's persona in the first and third games, and Lady Macbeth's in the second and last.

Macbeth is one of the bloodiest plays in the English language, and it is thrilling to be able to 'take part' in the action, and dictate it. A "strange device" in the first part of the program, is the newspaper which gives Macbeth information on the outcome of his battles — a novel but useful invention! With

the aid of this, and the text of the play, the player can guide the action along the path he knows it should take. After each section, there is a psychoanalytical interlude, during which the player will lie on the analyst's couch and answer questions on his actions. You don't have to use these extra programs, but your knowledge of the play will be deepened.

There's something here for everyone — the adventures themselves stand up against the best available for the Commodore, while the student of the play itself will learn a great deal from the book and programs.

Finally, some Help in Colditz, the adventure from Phipps. J Houghton writes from Southsea: "How do I get rid of the Guard in the Tower? I have tried everything I can!"

Well unfortunately for the poor old guard (who's only doing his job, after all), you must *Kill* him with the sharp knife, and then grasp his uniform — you'll need it later on.

Phipps have just released three of their old favourites in a "Super Value Pack". It really is super value, too, as for just £7.99 you get *Magic Mountain*, *Greedy Gulch* and, one of my personal favourites, *Knight's Quest* all in one package — it's a steal. The company also tells me that they have recently signed a deal with Les Aventures of Paris, to translate their adventures into French. Apparently this feat has been beyond the powers of normal mortals until now, as there are a number of subtle grammatical problems to overcome. So, mes amis. Bon chance dans votre Quest, et do not blow le garlic dans mon visage!

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LOOK!! swap my Atmos 48K, joystick, interface, software, books, J.V.C. mini TV radio cassette (cassette compatible) and 16K ZX81 + Software, books for Amstrad CPC464, genuine reason tel. Jerry 531 6480 (01).

ADVENTURE HELPLINE

Fantasia Diamond on Spectrum. How do I get across the river? Tony Slater, Flat 3, 87 Dunsmore Road, London N19.

Ghost Town on Atari. I cannot shoe the horse - I don't have the nails, and I can't open the safe with the gunpowder. Can anyone help? Chris Oakes, 62 Ashenground Road, Haywards Heath, West Sussex.

Twin Kingdom Valley on BBC. How do I get the master key from the dragon without getting burned to death? H Kulbick, 167 Duncan Road, Aylestone, Leicester.

Ship of Doom on Spectrum. How do you get the key from under the glass cover in the key room? Martin Parker, La Crake Avenue, Scartho, Grimsby, S Humberside.

The Castle on Spectrum. How do you get out of the chasm? Donald M Mackay, 2 Stewart Drive, Stornoway, Isle of Lewis, Scotland.

Zork's Kingdom on Vic20. I cannot get past the pit. Mrs C Fuller, 53 Hill Grove, Salendine Nook, Huddersfield, W Yorks.

Keys of the Wizard on Dragon. I'm one treasure short - I can't open all the chests but I can kill the jester. P Hampson, 10 Cherry Lane, Lawton Heath, Alsager, Stoke-on-Trent, Staffs.

Hobbit on Spectrum. Where do I go after crossing the fast black river in the wooden boat? I can't get beyond the elvish clearing. Phillip Shooter, 127 Green Farm Close, Loundley Green, Chesterfield, Derbyshire.

Voodoo Castle on Vic20. How do you go through the crack in the wall? Please help! Geoffrey Beardsell, 348 Central Park Road, East Ham, London E8.

Twin Kingdom Valley on Commodore 64. How do you get the master key of the dragon, in the north tower of the Desert Castle? Mark Woolway, 17 Bertram Drive, Meols, Wirral, Merseyside.

Velmor's Lair on Spectrum. Where are the oars for the bathtub? Chris Taubert, 136 Western Avenue, Dagenham, E Essex.

Hobbit on Spectrum. How do I kill the monstrous dragon, once I have got the treasure? M Bird, 35 Ashley Close, Pewsey, Wilts.

The Hulk on Commodore 64. How do I lift the ring? How do I get the wax? How do I get the big gem? Keith Willis, 2 Leicester Close, Hadrian Lodge, Newcastle-upon-Tyne, Wallsend, Tyne-and Wear.

Pimania on Spectrum. What is the significance of the red fish? Mark Lambert, 3 Mere Farm Grove, Oxtou, Birkenhead.

Mystery of Monroe Manor on Commodore 64. How do I open the wardrobe? P A Taylor, 167 Uplands Road, West Moors, Wimborne, Dorset.



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Name.....	Address.....
My top 3: Voting Week 4	1
	2
	3

All you have to do to vote is to fill in the form below with the names of your current three favourite software titles (or copy the form on to another sheet if you don't want to damage your magazine) and send it off as soon as possible for 'Top 10, Popular Computing Weekly, 12-13 Little Newport Street, London WC2H 7PP. We will send £50 each week to the person who correctly predicts that week's top three. If there is no winner then that week's prize is automatically added to the chart on which voting is currently taking place, and so on until someone gets it right! (If there is more than one winner that week's prize — whatever the pot stands at — will be split equally between all the correct entries.)

Voting for Week 4 closes at 2pm on Wednesday December 12. Entries received after that time will not be eligible for inclusion in that week's voting.

Each week Popular is compiling its own special software top ten chart — compiled by YOU.

Now voting on Week 4 — £100 to win

Week 2: No winner — £50 added to Week 4 chart fund

- 1 (1) Daley Thomson's Decathlon (Spectrum/C64)
 - 2 (6) Beach Head (C64)
 - 3 (4) Underworld (Spectrum)
 - 4 (3) Elite (BBC/Electron)
 - 5 (-) Kokonui Will (Spectrum/C64)
 - 6 (2) Danger Mouse in Double Trouble (Spectrum/C64) Creative Sparks
 - 7 (-) Knight Lore (Spectrum)
 - 8 (-) Sherlock (Spectrum/C64)
 - 9 (5) Pyramarama (Spectrum/C64/Amstrad)
 - 10 (8) Deus ex Machina (Spectrum)
- Ultimate
US Gold
Acornsoft
Elite
Creative Sparks
Ultimate
Melbourne House
Milk+Gen
Automata

- 1 (-) Magic Miner (Software Projects)
- 2 (-) Huntback (Ocean)
- 3 (-) Blagor (IBM)
- 4 (-) Classic Adventure (Amstrad)
- 5 (-) Fimmas Diamond (Hewlett)
- 6 (-) Roland Alroy (Amstrad)
- 7 (-) Snooker — Steve Davies (CDS)
- 8 (2) Forest At World's End (Mikropower)
- 9 (-) Return to Eden (Laser 9)
- 10 (1) Figures compiled by Books/Websters

- 1 (2) Attack of Mutant Carnies (Amstrad)
- 2 Zaxxon (Amstrad)
- 3 (6) Slinky (Kornax Massachusetts)
- 4 (7) Computer War (Amstrad)
- 5 (4) Gridrunner (Amstrad)
- 6 (1) Legat (Amstrad)
- 7 (9) Laser (Amstrad)
- 8 (1) Figures compiled by Books/Websters

- 1 (-) Sabers Wall (Amstrad)
- 2 (-) Music Master (Software Projects)
- 3 (1) Scrabble (Leisure Centus)
- 4 (2) Elite (Acornsoft)
- 5 (2) Ard Strike (Amstrad)
- 6 (4) Sway (Mikropower)
- 7 (7) Football Manager (Amstrad)
- 8 (-) Acid Drops (Amstrad)
- 9 (-) Duck (Amstrad)
- 10 (5) Main Office (Dialbase)

- 1 (-) Magic Miner (Software Projects)
- 2 (-) Huntback (Ocean)
- 3 (1) Cabinet in Space (Mikropower)
- 4 (3) Chicken Egg (V & E)
- 5 (9) Mystery of Ivan, Star (Spectre)
- 6 (5) Big (Mikropower)
- 7 (8) Knight (Mikropower)
- 8 (10) Split Mageic (Mikropower)
- 9 (4) Bug Diver (Mikropower)
- 10 (5) Figures compiled by Books/Websters

- 1 (-) Daley Thomson's Decathlon (Ocean)
- 2 (-) Aralon (Hewlett)
- 3 (2) Daley Thomson's Decathlon (Ocean)
- 4 (-) Select (Computer Records)
- 5 (1) Matchpoint (Ocean)
- 6 (2) Toronto Low Level (Ocean)
- 7 (-) World Cup (Aristo Software)
- 8 (10) Jet Set Willy (Software Projects)
- 9 (9) Full Throttle (Microcage)
- 10 (4) Beach Head (Software Projects)

- 1 (-) Body (Amstrad)
- 2 (-) Matchpoint (Ocean)
- 3 (-) Toronto Low Level (Ocean)
- 4 (-) Split of Stones (CDS)
- 5 (1) Inna Centus (Mikro Mega)
- 6 (1) Chessmasters (Amstrad)
- 7 (3) Clutter (Amstrad)
- 8 (3) D. Thomson's Decathlon (Ocean)
- 9 (8) Zaxxon (Comensoft)
- 10 (2) Bad News Maxxon (ITC Ltd)

- 1 (1) Pebble of Willy (Software Projects)
- 2 (2) Duck Shoot (Mikropower)
- 3 (3) Punchy (Thorn EMI)
- 4 (3) Sub Commander (Mikro Mikro)
- 5 (10) Rank (Amstrad)
- 6 (10) Rank (Amstrad)
- 7 (2) Tom's of Evil (Thorn EMI)
- 8 (-) Maze Gold (Amstrad)
- 9 (4) 3D Maze (Mikropower)
- 10 (1) Tank Commander (Thorn EMI)

Readers' Chart No 2

Event	Dates	Venue	Admission	Organisers
Which Computer? Show (over 180 only)	Jan 15-17 (1985)	Birmingham	Free in advance from 01-691 5051	Chapp & Pollak
Hi-Tech and Computers Trade	Jan 18-19	Birmingham	Free in advance from 01-350 1618	Computer Marketplace
Hi-Technology and Computers	Jan 24	Bathurst	Free in advance from 01-350 1618	Computer Marketplace
Education Exhibition	10.00am-1.00pm	London EC2	organisers	
Jan 24 1.00pm-8.00pm	Edinburgh			
Jan 25 11.00am-8.00pm	Edinburgh			
Public Jan 26	11.00am-6.00pm			
Feb 5-7	10.00am-6.00pm	Kensington Town Hall	Free in advance from 01-241 2554	Paradox
Agriplot and Strive Computer Show	Feb 5-7	London W8	organisers	
The IFT 85 International Trade Show	Feb 17-18	Olympia 2 London W6	Free in advance from 277000	Turner-Wheland 0833

Top 10

Diary

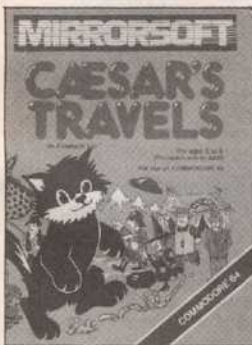
New Releases

HAIL CAESAR

Caesar the Cat was one of the most enchanting programs I've seen (maybe I just like cats) but I later found out that it was basically intended for young children. Oh well. *Caesar's Travels* is definitely for a young market and is obviously intended to be somewhat educational — it's the computer equivalent of bedtime stories.

The story begins with Caesar the Cat in his larder trying to rid it of mice (see previous program), failing, and being chucked unceremoniously into the yard. From then on you can alter the story by a simple choice of keys at each point. For example, in one section you must decide whether to hide in a bin or run away.

Depending on the choices you make at each point, a different story is followed. Some end with Caesar in a pretty sorry state, others with him safely tucked away in a warm home. Here and there in the program there are sections where you must answer some



simple questions to further the adventure.

The graphics are charming with excellent sound effects (Caesar's purr positively glows with pleasure, his plaintive mew is truly heart-tugging). With a wide variety of possible stories the program should last quite a while before it becomes repetitive. I think if you have children under ten, they should be transfixed by this one and I might add that I was, too.

Program *Caesar's Travels*
Price £7.95
Micro Commodore 64
Supplier Mirrorsoft
Holborn Circus
London EC1P 1DQ

BLACK GOLD

All of Sinclair's recent releases have been educational and many of them have been produced by Macmillan. *Oil Strike* is your big chance to run a multinational company and seek oil.

The main section of the program concerns getting surveys on likely looking areas of rock and trying to deduce from the available visual evidence of rock type and structure whether an oil strike is likely.

As you develop more and more strikes, so the world situation develops, boosting or hampering your expansion. You must adjust the rate of production at each oil well in accordance with world market conditions.

The program combines marketing and financial strategy with simple geology as you take risks and try to maximise profits. One of those rare edu-



cational programs that the pupils should like as much as the teachers.

Program *Oil Strike*
Price £9.95
Micro Spectrum
Supplier Sinclair Research
Stanhope Road
Camberley
Surrey GU15 3PS

BUTTERFLIES

Paddington's Garden Game is a machine code collect and dodge whose only distinguishing feature is that it features a main character that looks vaguely like the famous bear. Also, marmalade sandwiches feature somewhere in the plot.

The idea is to move Paddington around a garden collecting butterflies (surely an environmentally unsound act?) and dodging various other objects like hedgehogs and wasps. The garden extends to several screens of a fairly simple kind livened up with the occasional

pond and fountain.

The sandwich lurks somewhere in the garden and gives Paddington bonus points if he can find it. It's OK and little children who are already Paddington addicts may enjoy it, but, honestly, other than the bear it's really nothing special.

Program *Paddington's Garden Game*
Price £6.95
Micro Commodore 64
Supplier Collins Soft
8 Grafton Street
London W1X 3LA

CLEAN UP

Every so often I get programs sent in from readers, most of which are usually dire and are discreetly ignored. But *Litter Bug* from Solsoft is actually pretty good.

Briefly, the plot is to move a little space creature around a scrolling screen collecting rubbish bags and returning them to an incinerator. The screen is full of various sorts of rubbish, some of which is radioactive and must be quickly blasted before it explodes.

The graphics are smooth scrolling sprites and the sound is pretty good too; all in all a perfectly good game. The only problem is the whole thing looks incredibly like an early Ultimate game, so minus marks for originality. Nevertheless, there are worse ways of spending £4.95.

Program *Litter Bug*
Price £4.95
Micro Spectrum
Supplier Solsoft
2 Huntly Road
Liverpool L6 3AJ

This Week

Program	Type	Micro	Price	Supplier	Ed	BBC	£9.95	Acornsoft
Number 11	S	Amstrad	£5.50	Camel	Arc	C16	£6.99	Romik
Assembler	Ut	Amstrad	£11.60	Arnor	Ad	Commodore 64	£6.99	Romik
Flex Friend	Ut	Amstrad	£7.50	Camel	Ad	Commodore 64	£6.99	Romik
Grasp	Ut	Amstrad	£8.50	Camel	Ad	Commodore 64	£8.95	CRL
Toolbox	Ut	Amstrad	£4.95	Camel	Arc	Commodore 64	£6.99	Romik
Holy Horrors	Ad	BBC	£6.99	Romik	Arc	Commodore 64	£5.95	Firebird
The Land of Chark	Ad	BBC	£4.95	Della 4	Arc	Commodore 64	£7.95	System 3
Spooky Manor	Ed	BBC	£9.95	Acornsoft	Arc	Commodore 64	£6.95	Collins Soft

This Week

Program	Price	Supplier
Ice Castles	£8.00	Microdeal
Worlds of Flight	£8.00	Microdeal
Galaxias	£8.95	MKS
Chess	£4.95	Spectrum
3D Starstrike	£5.95	Spectrum
Buggy Blast	£5.95	Spectrum
Litter Bug	£4.95	Arc
Olympic Challenge	£4.95	Arc
Star Sphere	£8.95	Ut

Program	Price	Supplier
Suicide Strike	£7.95	Arc
Tapper	£9.95	Commodore 64
Trans	£9.95	Commodore 64
Caesar's Travels	£9.95	Commodore 64
Histech	£8.50	Megatron
Partis of Bear G.	£8.95	Cheethurst
Rapid Assembly Syst.	£14.99	Ronik
Demolition Derby	£8.00	Microdeal
Fruity	£4.95	Impost

Key: Ad — adventure/Arc — arcade/Ed — education/S — strategy-simulation/Ut — utility

Tapper is one of those games you'll either find very addictive and funny or completely boring and insane. When the

LAST ORDERS

These two concepts meet each other in *Olympic Challenge*. It's a game where you control a character based on *Track and Field*. Few programs about the Olympics are quite a few. For £1.99 and there are quite a few companies selling programs like this. There are now quite a few

programs like *Fahrenheit 451* and *Micro Commodore 64* are being issued in this country for a massive £19.95. Though that figure includes two discs and booklet. Since all the games have more or less the same format, I based on *Fahrenheit 451* based on the book by Ray Bradbury to look at being based on disc rather than graphic adventures. The graphics are detailed though not awe-inspiring, but the text analysis is good —

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WORTHY

Still, it is a good, sophisticated adventure. At £19.95 maybe else to buy it for you. You should persuade someone you should persuade someone else to buy it for you. You should persuade someone you should persuade someone else to buy it for you.

The cover is deeply offensive — the theme of the game is that you are trying to avoid being dragged by the devil into his lair and you stay on the path (allegory, no thanks) by answering the question. The cover depicts a scantily clad girl trying to drag a man into hell. Woman, ie, sexual temptation as the devil incarnate. This is a screen, play simple arcade games, etc. Unfortunately, not only are some of the games all introduced by people named Sid Shape, Simon Surface. In short, alliteration rears its ugly head again.

Some of the puzzles are moderately entertaining for about a minute, but really there is a terrible sense of randomness about the whole thing. In addition, written in Basic and you commonly expect — one of the reasons these games are described as interactive fiction rather than graphic adventures. The graphics are detailed though not awe-inspiring, but the text analysis is good —

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HOT STUFF

The cover is deeply offensive — the theme of the game is that you are trying to avoid being dragged by the devil into his lair and you stay on the path (allegory, no thanks) by answering the question. The cover depicts a scantily clad girl trying to drag a man into hell. Woman, ie, sexual temptation as the devil incarnate. This is a screen, play simple arcade games, etc. Unfortunately, not only are some of the games all introduced by people named Sid Shape, Simon Surface. In short, alliteration rears its ugly head again.

There's another thing, too. Plus it's just silly. Justification if sold cheap as an educational package. At £5 would only have some small fame, written in Basic and you commonly expect — one of the reasons these games are described as interactive fiction rather than graphic adventures. The graphics are detailed though not awe-inspiring, but the text analysis is good —



UNFORTUNATE

New Releases

Pick of the week

FROG STEW

Mikro Gen's programs have been getting better and better recently — the graphics have got bigger, the games design have improved markedly. The techniques which have improved the arcade games so much have now been introduced to create a graphics adventure with some of the most impressive illustrations yet seen.

The Witches Cauldron not only features excellent graphics, but has an unusual and entertaining plot. You have been transformed by the kind of magic that is part of the standard kit in adventure games, into a frog and must transform yourself, stage by stage through virtually every kind of intermediate animal until you arrive back to your human state.

You actually appear on the

screen as the animal you currently are; one interesting feature of the plot is that your choices within the adventure are limited by what animal you are. There are riddles to be solved in return for help, a nice new character set and intelligent use of colour not only in the graphics, but in the text itself.

It's cute rather than macho with a lot of humour, but fiendish enough for all that. It understands pretty complicated sentences and kept me entertained for hours. What more do you want?

Program *The Witches Cauldron*
Price £6.95
Micro *Spectrum*
Supplier *Mikro-Gen*
44 The Broadway
Bracknell
Berks

blurb says that the game has five separate game screens this is true, but really it is only the same idea represented in different ways — in this respect it is a bit like life or *Finnegans Wake* for that matter.

And so the idea on which it all hinges — you are a bartender (the bartender or publican is apparently known as a Tapper in America from whence this program comes — isn't English a funny language?) who must serve a mob of unruly customers, all of whom demand instant service and none of whom pay for their drinks — a bit like our office party ac-

tually.

Your barman must rush about from customer to customer serving their drinks before they overrun the bar. Not only this, but empty glasses are returned by being slid back across the bar top, you have to be there to catch them and return a full glass.

So it's a running about, dodging back and forth at ever greater speed, keeping your eyes open for customers and glasses type of game, and either that's enough or it isn't.

Program *Tapper*
Price £9.95
Micro *Commodore 64*

Supplier *US Gold*
Unit 10
Parkway Industrial
Centre
Heneage Street
Birmingham B7 4LY

SUPER FUN

In *Demons of Topaz*, the idea is that you are a spaceman and you must collect legendary sacred crystals from the demon guardians. The way through the many passages to each crystal is difficult and requires much pondering of pace and jumps — watch out if you fall because your little spaceman will crash to earth with decidedly nasty bump! (Hang on a minute, I seem to have written this before somewhere.)

Anyway, it's absolutely fantastic the way you can go through all these screens of action with different problems to be solved on each one (hang on, I'm getting confused — what month is this, what year?). Can you figure out how to get from platform to platform and collect the sacred crystals (I

keep seeing this mine with penguins and kangeroos and keys you have to collect).

What amazingly exciting fun it all is! Aren't you glad you are in such an innovative, razor's edge of technology-type industry?

Program *Demons of Topaz*
Price £8.95
Micro *Commodore 64*
Supplier *Firebird Software*
Wellington House
Upper St Martin's Lane
London WC2H 9DL

ROLLSROYCE

The Expert Sprite Editor is the Rolls Royce of sprite editors, of which there are many for the Commodore 64.

Anything you want for the design of sprites is there, well documented and with all the additional information about using the sprites from Basic you could wish. Expensive but good.

Program *Expert Sprite Editor*
Price £8.95
Micro *Commodore 64*
Supplier *Android Dreams*
94 Rednal Road
Kings Morton
Birmingham B38 8DU

Compiled by Graham Taylor



New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

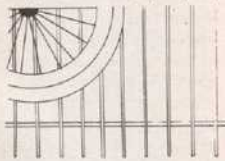
This Week

Acornsoft, Betjeman House, 104 Hills Rd, Cambridge CB2 1LQ
Arnor, 76 Isham Road, London, SW16 4TF **CRL**, CRL House, 9 Kings Yard, Carpenter's Road, London E15 2HD, 01 533 2918
Cheetahsoft, 24 Ray Street, London, EC1R 3DJ, 01 833 4909
Camel, Wellpark, Willeys Ave, Exeter EX2 8BE, 0392 211892
Century City, 99 High Street, Dudley West, Midlands DY1 1QP, 0384 57077
Collins Soft, 8 Grafton Street, London W1X 3LA, 01 493 7070
Delta 4, The Shieling, New Road, Swanmore, Hants SO3 9PE, 04893 5800
Eclipse, 79 Ardrossen Gardens, Worcester Park, Surrey, KT4 7AX, 01 330 3116
Firebird, Wellington House, Upper St Martin's Lane, London WC2H 9DL, 01 379 6755
Impsoft, 149 Balham Hill, London SW12, 01 675 5577
Kuma, Kuma Computers, 12 Horseshoe Park, Pangbourne, RG8 7JW, 07357 4335
Megatron, 22 Mountfield Gardens, Kenton, Newcastle upon

Tyne, NE3 3DB, 091 285 1721
Microdeal, 41 Truro Road, St Austell, Cornwall, PL25 5JE, 0726 73456
Mirrorsoft, Mirror Group, Holborn Circus, London EC1P 1DQ, 01 353 0246
Real Time, Prospect House, 32 Sovereign Street, Leeds LS1 4BJ, 0532 458948
Romik, 272 Argyll Avenue, Slough, SL1 4HE, 0753 71535
Solsoft, 2 Hurlly Road, Liverpool L63AJ, **System 3**, 138 Carlton Avenue, East Wembley, Middlesex, **US Gold**, US Gold, Unit 10 The Parkway Ind Centre, Heneage Street, Birmingham B7 4LY, 021 359 3020.

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

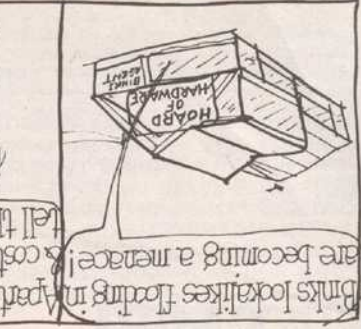
Locked out
 Simon Scatterbray has chained his bicycle to the railings outside the 'Dog and Puddle', and now finds that he has forgotten the 3-digit combination that opens the lock.
 "I know that the number divided by the sum of its digits is equal to my age (in years)," he said hopefully to Dr. Dimwit, who happened to be passing.



Fortunately, the doctor was pretty good at lightning calculations, and had soon narrowed it down to six possible values.
 "I know exactly which one it is," exclaimed Simon, "You see, I have just recalled what the number digit is."
 Now, the doctor had the advantage of knowing Master Scatterbray's age. We don't, but can you determine what the combination was — and Simon's age?

Solution to Puzzle 131
 325 blocks can form a triangle of 25 rows, and squares of 18 x 18 and 1 x 1; 17 x 17 and 6 x 6; or 15 x 15 and 10 x 10.
 The program generates successive triangular numbers by summing consecutive integers, each total being tested to see if it can be broken into component square pairs. The first answer that gives three alternative sets of squares is the solution.
 10 LET T = 0
 20 LET ROW = 1
 30 LET S = T + ROW
 40 FOR F = 1 TO SOR(T) 50 LET S = T - F
 60 LET SQ = SOR(S)
 70 LET SQ = VALSTR\$(SQ) 80 IF SQ > F AND SQ = INT(SQ) THEN PRINT "T: ", ROW, "SQS:", F, "SQ 90 NEXT F
 100 ROW = ROW + 1
 GOTO 30

Winner of Puzzle No 131
 The winner is Jenny Lightowler of Burnell Road, Sheffield, who receives £10.
 If the puzzle can be sensibly solved using a computer, then the winner will have included a listing of the program used to find the correct answer. The closing date for Puzzle No 136 is December 21.



So for Peter's sake, be careful not to buy one by mistake.

Well them from the real thing!

are becoming a menace! It's costing half the price, you can't

The Hackers

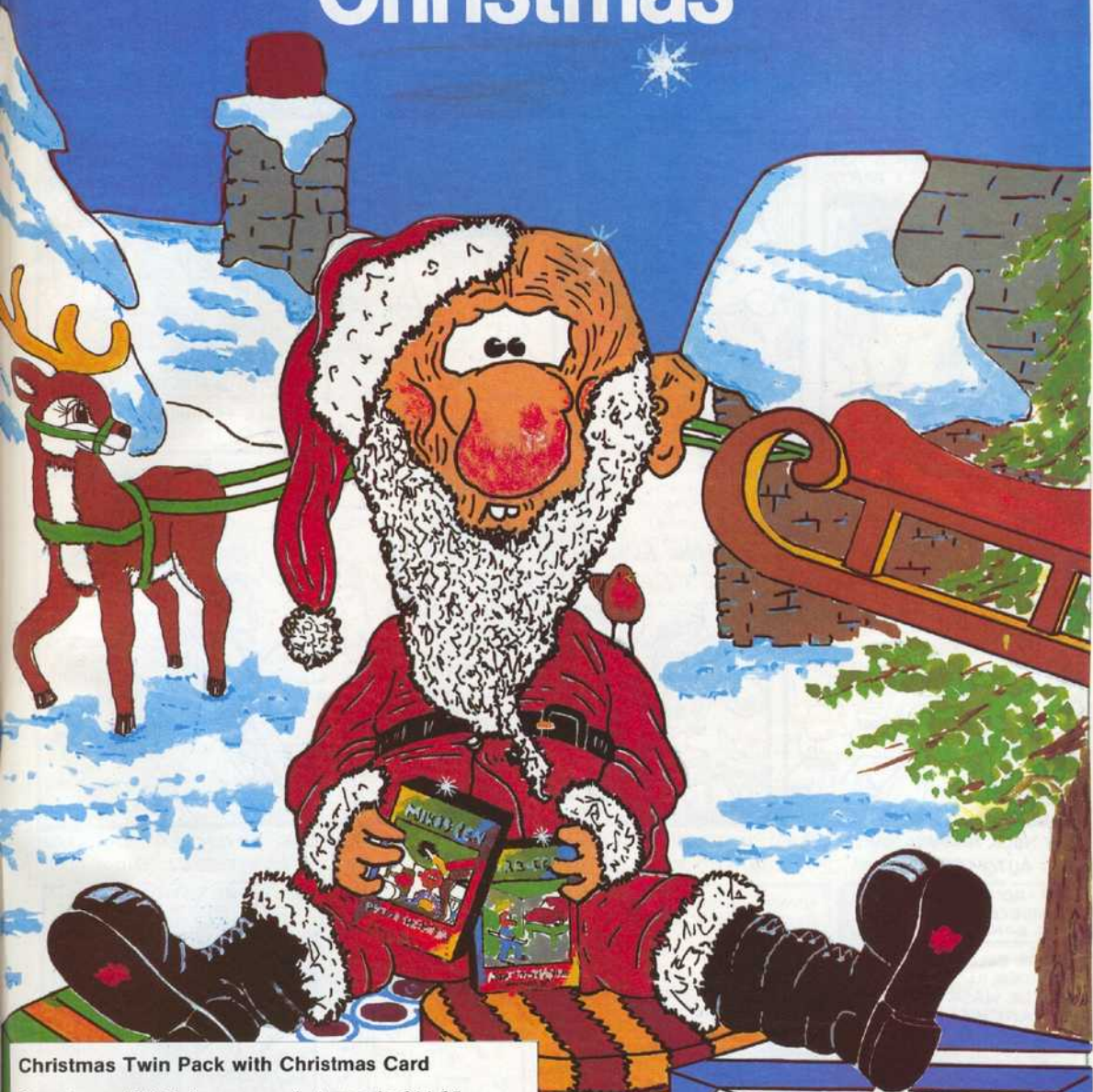
On the ordinary, commercial scale I see it working something like this. Professor Moriarty, a criminal of deepest dye and one of the most evil men ever to walk the earth, wants to make a fortune and illicit copy of *Pilmane Kongtrogger* *Liamntack* for his own file purposes. The first step of his monstrous plot is to break into the program... but the defences, the machines-coded walls of ICE, are ready for him.
 At the first break-in attempt, the program hits back! First the screen begins to flicker at a certain strobe frequency, tuned to the rhythms of the optic nerve. This can cause epilepsy and certain sub-sonic vibrations which drone from the micro-speaker, at those special low frequencies which stir the guts and fill people with panic and nausea. (Spectrum owners get off lightly here since its sound oscillator isn't too good at even quite ordinary frequencies.) Swirling, convergent, hypnotic patterns follow which fill the screen, sucking in the gaze of the user, producing a deepening hypnotic trance (unless, of course to read, conveys a subliminal message straight into the deepest levels of the unconscious mind, nullifying firm commands. *Set fire to your jacket-copying software. Kick your cassette unit violently across the room. Throw your computer on the floor and jump up and down on it. You MUST obey. You cannot resist.*)
 Do you think it could work? The technical details of all this world, of course, have to be left to the software people to sort out.
 I fully expect that as the technique is developed further along William Gibson's lines, the switching, brain-scrambled bodies of failed software pirates will become commonplace. There's only one small remaining worry. Recently I was using an assembler which (like so many assemblers) takes several hundred years to load from tape, isn't available on disc, and crashes if you so much as breathe in the same room. One wrong keystroke at the menu level (let alone when actually trying to run machine-code) can make the whole thing seize up. I know the because I hit a cursor key by mistake and the program had a fit. Furious bashing at the *break* key produced a mysterious pause and then, before I was dumped back into Basic, the message *Copying tapes is illegal* appeared.
 I spent several hours hating and cursing whoever wrote that program.
 I haven't dared since even to pick up William Gibson's book, just in case...

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From the vast resources of my technical knowledge — gained from 20 years of reading science fiction — I have a suggestion to offer.
 An SF novel I recently came across was William Gibson's *Neuromancer* (Collins £8.95), parts of which are exciting inside-the-computer network action that sets you dreaming at 1500 baud. A bit like *Tron*, in fact, only with a plot which very nearly makes sense. Anyway, not to be sidetracked, one of the hazards of 'cyber-space' practice in *Neuromancer* is the dreaded black ice. ICE in the book stands for intrusion Countermeasures Electronics, the defence systems of a computer installation or even, by extension, a program. Black ice is an especially nasty version which (in ways never very clearly explained) does especially nasty things to greatly trying toinker with the defences and break security. What sort of nasty things? Oh, total cessation of neural activity, brain death, etc.
 Of course, as an SF idea the last astonishingly new. Fred Hoyle's *The Black Cloud* (1957) and Piers Anthony's *Macroscopic* (1968) both introduced the notion of killer information. Listen to the go bananas because the human brain can't cope with the intricate alien logic-chains.
 So how, ask the software people, could this be put into practice in the real world of computing? After all, if there are algorithms which can unlock your mind and scramble the contents, they're probably jealously guarded trade secrets of the Pentagon and the Kremlin. Or the Ministry of Defence, which is well known for slapping SECRET classifications on to software protection systems which actually seem to work.



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THE GANG HAVE PASSED THROUGH THE GATES INTO PILDAN WHERE THEY MUST SORT OUT THEIR TAX...

WELL, D'YOU KNOW ANY GOOD HOTELS?

YEAR-A MATE OF MINE WORKS AT THE SAVILEY

BEAN BRAMM

WELL, I'D JUST SAY DON'T GET IN A FLAP DAVID!

I'LL JUST SAY I'LL DELIVER MY MESSAGE

WELL BEFORE

YEAK! WATER! SOCKS! GUDS, SUDS, SUDS! IM SURROUNDED BY SILT!

E KEEPT AROUND E AD A MEASIT, SOM WE SHOWN IM INSIDE!

A MEASIT, SOM WE SHOWN IM INSIDE!

THE SKY!

FIND OUT MORE - NEXT WEEK!!!

DAVID LAKE PCW

WHAT'S COMING NEXT? WHAT ARE AUTOMATA UP TO?

AHEM, LADIES AND GENTLEMEN, BEFORE WE CONTINUE WITH THIS WEEKS CARTOON, I'D JUST LIKE TO BID THANKS, ON BEHALF OF MY PAIS AT AUTOMATA, TO ALL THE EXHIBITORS AND VISITORS AT THE LAST ALLY PALLY ZX MICROPAIR, WHOSE KIND DONATIONS TO THE ETHIOPIA DISASTER FUND TOTALLED £218.

THANK YOU.

NOM-ZE KARTUNE!!

WELL, REPAIRS THERE IS A SPACE...

LISTEN, SLOB... IF YOU DON'T FIND US A ROOM, WE'RE ALL GONNA BOSS IN YOUR LOBBY-FOREVER!!

SOBRR, PILLVS UPPVS!

NONSENSE! YOU MUST HAVE SOME SPACE HERE!

NO! HE'S LEFT!

SOME PI IN A FOONN COSTUME WAS THERE...

LET'S TRY THE PILTON!

WATCH! PIMAN - THAT'S ADVERTISIN'... WOR-

HE'LL LET US HAVE A ROOM OR TWO FOR A FEE?

COPY OF PARTZ

LET'S ALL GO AND WASH OUR DIRTY LIVEN IN PUBLIC!

LET'S DO MY LAUNDRY - I DIDN'T BRING A CHANGE ARE - OH, IT'S BEGINNING TO SNOW!

MUST BE FAIRY SNOW!

SOFTWARE LAB

HEY, I KNOW A SHUTTLE SONG ROOM SHARLOTS.

CHAPLOT IN THE HOTEL MULTISTOREY CAR PARK.

WHAT ARE ALL THESE ROMAN PIMEN DOING HERE, ANYWAY?

KEEPING THE LOCALS OCCUPIED?

GREAT SITUATED TWIX A FORD ESCORT AND A CHAPLOT IN THE HOTEL MULTISTOREY CAR PARK.

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DA - NO ROOM AT THE LAUNDETTTE EITHER, YOU BOYS GONNA BE LONG?

AR, WE BELONG ON YARDNER ILL, BUD WE GOTTER WASH IMAR SARKSI WANT ANY SOBE FLAKES?

THANKS, BUT MY CHUM ROSTAFIMAN IS BRINGING SOME

NOMAN, AH SAID AH WAS BREENGIN MAH AERIAL!!

HEY! THERE'S SOMEONE IN THAT MACHINE, GOING ROUND AND ROUND WITH THE SOCKS! STAND BACK

NAMI, DON'T DU THART!!

WELL BEFORE

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